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(54) **LOCATION-BASED CATEGORICAL INFORMATION SERVICES**

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(58) **Field of Classification Search**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,644,351	A	2/1987	Zabarsky et al.
4,903,212	A	2/1990	Yokouchi et al.
4,907,159	A	3/1990	Mauge et al.
4,999,783	A	3/1991	Tenmoku et al.
5,031,104	A	7/1991	Ikeda et al.

(Continued)

FOREIGN PATENT DOCUMENTS

BR	9904979	12/2000
CA	2163215	5/1994

(Continued)

OTHER PUBLICATIONS

Dey, "Context-Aware Computing: The CyberDesk Project," [online] Retrieved from the Internet: URL: http://www.cc.gatech.edu/fce/cyberdesk/pubs/AAAI98/AAAI98.html; AAAI '98 Spring Symposium, Stanford University, Mar. 23-25, 1998, downloaded from the Internet on Aug. 6, 2010, 8 pages.

(Continued)

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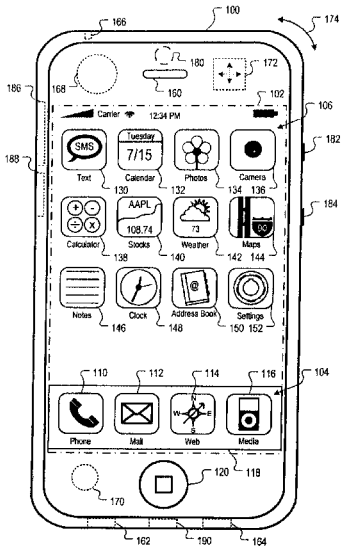
(57) **ABSTRACT**

A selection of a category of interest and location information is used to determine categorical information that is provided to a device. In some implementations, the device includes a touch-sensitive display and presents the categorical information on a map using an indicator. In some implementations, the categorical information can be shared and/or updated by others.

21 Claims, 10 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,046,011 A 9/1991 Kakihara et al.
5,067,081 A 11/1991 Person
5,126,941 A 6/1992 Gurmu et al.
5,164,904 A 11/1992 Sumner
5,170,165 A 12/1992 Iihoshi et al.
5,173,691 A 12/1992 Sumner
5,182,555 A 1/1993 Sumner
5,187,810 A 2/1993 Toneyama et al.
5,195,031 A 3/1993 Ordish
5,208,763 A 5/1993 Hong et al.
5,218,629 A 6/1993 Dumond, Jr. et al.
5,243,652 A 9/1993 Teare
5,274,560 A 12/1993 LaRue
5,289,572 A 2/1994 Yano et al.
5,295,064 A 3/1994 Malec et al.
5,307,278 A 4/1994 Hermans et al.
5,317,311 A 5/1994 Martell et al.
5,337,044 A 8/1994 Folger et al.
5,339,391 A 8/1994 Wroblewski et al.
5,371,678 A 12/1994 Nomura
5,374,933 A 12/1994 Kao
5,379,057 A 1/1995 Clough et al.
5,390,125 A 2/1995 Sennott et al.
5,406,490 A 4/1995 Braegas
5,416,712 A 5/1995 Geier et al.
5,416,890 A 5/1995 Beretta
5,463,725 A 10/1995 Henckel
5,469,362 A 11/1995 Hunt et al.
5,479,600 A 12/1995 Wroblewski et al.
5,504,482 A 4/1996 Schreder
5,508,707 A 4/1996 LeBlanc et al.
5,510,801 A 4/1996 Engelbrecht et al.
5,519,760 A 5/1996 Borkowski et al.
5,523,950 A 6/1996 Peterson
5,537,460 A 7/1996 Holliday, Jr. et al.
5,539,395 A 7/1996 Buss
5,539,647 A 7/1996 Shibata et al.
5,552,989 A 9/1996 Bertrand
5,559,520 A 9/1996 Barzeger et al.
5,570,412 A 10/1996 LeBlanc
5,598,572 A 1/1997 Tanikoshi et al.
5,627,547 A 5/1997 Ramaswamy et al.
5,627,549 A 5/1997 Park
5,628,050 A 5/1997 McGraw
5,630,206 A 5/1997 Urban et al.
5,636,245 A 6/1997 Ernst
5,642,303 A 6/1997 Small
5,646,853 A 7/1997 Takahashi et al.
5,654,908 A 8/1997 Yokoyama
5,663,732 A 9/1997 Stangeland et al.
5,675,362 A 10/1997 Clough et al.
5,675,573 A 10/1997 Karol et al.
5,677,837 A 10/1997 Reynolds
5,684,859 A 11/1997 Chanroo et al.
5,689,252 A 11/1997 Ayanoglu et al.
5,689,270 A 11/1997 Kelley et al.
5,689,431 A 11/1997 Rudow et al.
5,708,478 A 1/1998 Tognazzini
5,717,392 A 2/1998 Eldridge
5,732,074 A 3/1998 Spaur et al.
5,742,666 A 4/1998 Alpert
5,745,865 A 4/1998 Rostoker et al.
5,748,109 A 5/1998 Kosaka et al.
5,752,186 A 5/1998 Malackowski et al.
5,754,430 A 5/1998 Sawada
5,758,049 A 5/1998 Johnson et al.
5,760,773 A 6/1998 Berman et al.
5,767,795 A 6/1998 Schaphorst
5,774,824 A 6/1998 Streit et al.
5,774,829 A 6/1998 Cisneros et al.
5,793,630 A 8/1998 Theimer
5,796,365 A 8/1998 Lewis et al.
5,796,613 A 8/1998 Kato et al.
5,806,018 A 9/1998 Smith et al.
5,825,306 A 10/1998 Hiyokawa et al.
5,825,884 A 10/1998 Zdepski et al.
5,831,552 A 11/1998 Sogawa et al.
5,835,061 A 11/1998 Stewart
5,839,086 A 11/1998 Hirano
5,845,227 A 12/1998 Peterson
5,848,373 A 12/1998 DeLorme et al.
5,862,244 A 1/1999 Kleiner et al.
5,867,110 A 2/1999 Naito et al.
5,870,686 A 2/1999 Monson
5,872,526 A 2/1999 Tognazzini
5,873,068 A 2/1999 Beaumont et al.
5,883,580 A 3/1999 Briancon
5,887,269 A 3/1999 Brunts et al.
5,892,454 A 4/1999 Schipper et al.
5,893,898 A 4/1999 Tanimoto
5,898,680 A 4/1999 Johnstone
5,899,954 A 5/1999 Sato
5,905,451 A 5/1999 Sakashita
5,908,465 A 6/1999 Ito et al.
5,910,799 A 6/1999 Carpenter
5,923,861 A 7/1999 Bertram et al.
5,933,094 A 8/1999 Goss et al.
5,933,100 A 8/1999 Golding
5,936,572 A 8/1999 Loomis et al.
5,938,721 A 8/1999 Dussell et al.
5,941,930 A 8/1999 Morimoto et al.
5,941,934 A 8/1999 Sato
5,946,618 A 8/1999 Agre et al.
5,948,040 A 9/1999 DeLorme et al.
5,948,041 A 9/1999 Abo et al.
5,948,061 A 9/1999 Merriman et al.
5,955,973 A 9/1999 Anderson
5,959,577 A 9/1999 Fan
5,959,580 A 9/1999 Maloney et al.
5,968,109 A 10/1999 Israni et al.
5,969,678 A 10/1999 Stewart
5,982,298 A 11/1999 Lappenbusch et al.
5,982,324 A 11/1999 Watters et al.
5,987,381 A 11/1999 Oshizawa
5,991,692 A 11/1999 Spencer, II et al.
5,999,126 A 12/1999 Ito
6,002,932 A 12/1999 Kingdon et al.
6,002,936 A 12/1999 Roel-Ng et al.
6,005,928 A 12/1999 Johnson
6,014,090 A 1/2000 Rosen et al.
6,014,607 A 1/2000 Yagyu et al.
6,023,653 A 2/2000 Ichimura et al.
6,026,375 A 2/2000 Hall et al.
6,028,550 A 2/2000 Froeberg et al.
6,029,069 A 2/2000 Takaki
6,031,490 A 2/2000 Forssen et al.
6,041,280 A 3/2000 Kohli et al.
6,052,645 A 4/2000 Harada
6,058,350 A 5/2000 Ihara
6,064,335 A 5/2000 Eschenbach
6,067,502 A 5/2000 Hayashida et al.
6,069,570 A 5/2000 Herring
6,073,013 A 6/2000 Agre et al.
6,073,062 A 6/2000 Hoshino et al.
6,076,041 A 6/2000 Watanabe
6,078,818 A 6/2000 Kingdon et al.
6,081,206 A 6/2000 Kielland
6,085,090 A 7/2000 Yee et al.
6,085,148 A 7/2000 Jamison
6,087,965 A 7/2000 Murphy
6,088,594 A 7/2000 Kingdon et al.
6,091,956 A 7/2000 Hollenberg
6,091,957 A 7/2000 Larkins
6,092,076 A 7/2000 McDonough et al.
6,094,607 A 7/2000 Diesel
6,101,443 A 8/2000 Kato
6,104,931 A 8/2000 Havinis et al.
6,108,555 A 8/2000 Maloney et al.
6,111,541 A 8/2000 Karmel
6,115,611 A 9/2000 Kimoto et al.
6,115,754 A 9/2000 Landgren
6,119,014 A 9/2000 Alperovich et al.
6,122,520 A 9/2000 Want et al.
6,125,279 A 9/2000 Hyziak et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,127,945 A 10/2000 Mura-Smith
6,128,482 A 10/2000 Nixon et al.
6,128,571 A 10/2000 Ito et al.
6,134,548 A 10/2000 Gottsman et al.
6,138,003 A 10/2000 Kingdon et al.
6,138,142 A 10/2000 Linsk
6,140,957 A 10/2000 Wilson et al.
6,151,309 A 11/2000 Busuioc et al.
6,151,498 A 11/2000 Roel-Ng et al.
6,154,152 A 11/2000 Ito
6,157,381 A 12/2000 Bates et al.
6,157,841 A 12/2000 Bolduc et al.
6,163,749 A 12/2000 McDonough et al.
6,166,627 A 12/2000 Reeley
6,167,266 A 12/2000 Havinis et al.
6,169,552 B1 1/2001 Endo et al.
6,175,740 B1 1/2001 Souissi et al.
6,177,905 B1 1/2001 Welch
6,177,938 B1 1/2001 Gould
6,181,934 B1 1/2001 Havinis et al.
6,185,427 B1 2/2001 Krasner et al.
6,188,959 B1 2/2001 Schupfner
6,195,557 B1 2/2001 Havinis et al.
6,195,609 B1 2/2001 Pilley et al.
6,199,014 B1 3/2001 Walker
6,199,045 B1 3/2001 Giniger et al.
6,199,099 B1 3/2001 Gershman et al.
6,202,008 B1 3/2001 Beckert et al.
6,202,023 B1 3/2001 Hancock et al.
6,208,866 B1 3/2001 Rouhollahzadeh et al.
6,212,473 B1 4/2001 Stefan et al.
6,216,086 B1 4/2001 Seymour et al.
6,222,483 B1 4/2001 Twitchell et al.
6,233,518 B1 5/2001 Lee
6,236,365 B1 5/2001 LeBlanc et al.
6,236,933 B1 5/2001 Lang
6,246,948 B1 6/2001 Thakker
6,249,252 B1 6/2001 Dupray
6,252,543 B1 6/2001 Camp
6,252,544 B1 6/2001 Hoffberg
6,256,498 B1 7/2001 Ludwig
6,259,405 B1 7/2001 Stewart et al.
6,266,612 B1 7/2001 Dussell et al.
6,266,614 B1 7/2001 Alumbaugh
6,266,615 B1 7/2001 Jin
6,272,342 B1 8/2001 Havinis et al.
6,278,884 B1 8/2001 Kim
6,281,807 B1 8/2001 Kynast et al.
6,282,491 B1 8/2001 Bochmann et al.
6,282,496 B1 8/2001 Chowdhary
6,295,454 B1 9/2001 Havinis et al.
6,298,306 B1 10/2001 Suarez et al.
6,304,758 B1 10/2001 Iierbig et al.
6,313,761 B1 11/2001 Shinada
6,314,369 B1 11/2001 Ito et al.
6,314,406 B1 11/2001 O'Hagan et al.
6,317,684 B1 11/2001 Roeseler et al.
6,321,158 B1 11/2001 DeLorme et al.
6,323,846 B1 11/2001 Westerman et al.
6,324,692 B1 11/2001 Fiske
6,326,918 B1 12/2001 Stewart
6,332,127 B1 12/2001 Bandera et al.
6,339,437 B1 1/2002 Nielsen
6,339,746 B1 1/2002 Sugiyama et al.
6,343,317 B1 1/2002 Glorikian
6,345,288 B1 2/2002 Reed et al.
6,351,235 B1 2/2002 Stilp
6,353,398 B1 3/2002 Amin et al.
6,353,743 B1 3/2002 Karmel
6,353,837 B1 3/2002 Blumenau
6,356,761 B1 3/2002 Huttunen
6,356,763 B1 3/2002 Kangas et al.
6,356,836 B1 3/2002 Adolph
6,356,838 B1 3/2002 Paul
6,370,629 B1 4/2002 Hastings et al.
6,377,886 B1 4/2002 Gotou
6,381,465 B1 4/2002 Chern et al.
6,381,539 B1 4/2002 Shimazu
6,381,603 B1 4/2002 Chan et al.
6,385,458 B1 5/2002 Papadimitriou et al.
6,385,465 B1 5/2002 Yoshioka
6,385,535 B2 5/2002 Ohishi et al.
6,389,288 B1 5/2002 Kuwahara et al.
6,401,032 B1 6/2002 Jamison
6,405,034 B1 6/2002 Tijerino
6,405,123 B1 6/2002 Rennar et al.
6,411,899 B2 6/2002 Dussell et al.
6,414,635 B1 7/2002 Stewart et al.
6,415,207 B1 7/2002 Jones
6,415,220 B1 7/2002 Kovacs
6,415,227 B1 7/2002 Lin
6,427,115 B1 7/2002 Sekiyama
6,430,411 B1 8/2002 Lempio et al.
6,434,530 B1 8/2002 Sloane et al.
6,438,490 B2 8/2002 Ohta
6,449,485 B1 9/2002 Anzil
6,452,498 B2 9/2002 Stewart
6,456,234 B1 9/2002 Johnson
6,456,956 B1 9/2002 Xiong
6,459,782 B1 10/2002 Bedrosian et al.
6,463,289 B1 10/2002 Havinis et al.
6,477,581 B1 11/2002 Carpenter
6,487,305 B2 11/2002 Kambe et al.
6,490,454 B1 12/2002 Kangas et al.
6,490,519 B1 12/2002 Lapidot et al.
6,501,421 B1 12/2002 Dutta et al.
6,505,046 B1 1/2003 Baker
6,505,048 B1 1/2003 Moles et al.
6,505,123 B1 1/2003 Root et al.
6,507,802 B1 1/2003 Payton et al.
6,516,197 B2 2/2003 Havinis et al.
6,519,463 B2 2/2003 Tendler
6,526,335 B1 2/2003 Treyz et al.
6,529,143 B2 3/2003 Mikkola et al.
6,535,140 B1 3/2003 Goss et al.
6,542,812 B1 4/2003 Obradovich et al.
6,542,819 B1 4/2003 Kovacs et al.
6,546,360 B1 4/2003 Gilbert et al.
6,552,682 B1 4/2003 Fan
6,563,430 B1 5/2003 Kemink et al.
6,564,143 B1 5/2003 Alewine et al.
6,570,557 B1 5/2003 Westerman et al.
6,571,279 B1 5/2003 Herz et al.
6,574,484 B1 6/2003 Carley
6,587,688 B1 7/2003 Chambers et al.
6,587,782 B1 7/2003 Nocek et al.
6,587,835 B1 7/2003 Treyz et al.
6,594,480 B1 7/2003 Montalvo et al.
6,597,305 B2 7/2003 Szeto et al.
6,611,687 B1 8/2003 Clark et al.
6,611,788 B1 8/2003 Hussa
6,615,131 B1 9/2003 Rennard et al.
6,615,213 B1 9/2003 Johnson
6,647,257 B2 11/2003 Owensby
6,650,902 B1 11/2003 Richton
6,650,997 B2 11/2003 Funk
6,662,016 B1 12/2003 Buckham et al.
6,662,023 B1 12/2003 Helle
6,667,963 B1 12/2003 Rantalainen et al.
6,671,377 B1 12/2003 Havinis et al.
6,674,849 B1 1/2004 Froeberg
6,677,894 B2 1/2004 Sheynblat et al.
6,678,516 B2 1/2004 Nordman et al.
6,679,932 B2 1/2004 Birler et al.
6,680,694 B1 1/2004 Knockeart et al.
6,681,120 B1 1/2004 Kim
6,683,538 B1 1/2004 Wilkes, Jr.
6,697,018 B2 2/2004 Stewart
6,697,734 B1 2/2004 Suomela
6,711,408 B1 3/2004 Raith
6,711,474 B1 3/2004 Treyz et al.
6,714,791 B2 3/2004 Friedman
6,718,344 B2 4/2004 Hirono
6,721,572 B1 4/2004 Smith et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,731,236 B1 5/2004 Hager et al.
6,731,238 B2 5/2004 Johnson
6,732,047 B1 5/2004 de Silva
6,738,808 B1 5/2004 Zellner et al.
6,741,188 B1 5/2004 Miller et al.
6,741,926 B1 5/2004 Zhao et al.
6,748,226 B1 6/2004 Wortham
6,748,318 B1 6/2004 Jones
6,750,883 B1 6/2004 Parupudi et al.
6,759,960 B2 7/2004 Stewart
6,762,772 B1 7/2004 Imamura et al.
6,766,174 B1 7/2004 Kenyon
6,781,575 B1 8/2004 Hawkins et al.
6,782,278 B2 8/2004 Chen et al.
6,789,012 B1 9/2004 Childs et al.
6,795,686 B2 9/2004 Master et al.
6,801,855 B1 10/2004 Walters et al.
6,810,323 B1 10/2004 Bullock et al.
6,813,501 B2 11/2004 Kinnunen et al.
6,813,503 B1 11/2004 Zillikens et al.
6,816,782 B1 11/2004 Walters et al.
6,819,919 B1 11/2004 Tanaka
6,823,188 B1 11/2004 Stern
6,834,195 B2 12/2004 Brandenberg et al.
6,845,318 B1 1/2005 Moore et al.
6,847,891 B2 1/2005 Pietras et al.
6,847,969 B1 1/2005 Mathai et al.
6,853,911 B1 2/2005 Sakarya
6,853,917 B2 2/2005 Miwa
6,859,149 B1 2/2005 Ohta
6,865,483 B1 3/2005 Cook, III et al.
6,868,074 B1 3/2005 Hanson
6,871,144 B1 3/2005 Lee
6,882,313 B1 4/2005 Fan et al.
6,888,536 B2 5/2005 Westerman et al.
6,909,902 B1 6/2005 Sawada et al.
6,912,398 B1 6/2005 Domnitz
6,914,626 B2 7/2005 Squibbs
6,915,208 B2 7/2005 Garin et al.
6,933,841 B2 8/2005 Muramatsu et al.
6,944,447 B2 9/2005 Portman et al.
6,948,656 B2 9/2005 Williams
6,952,181 B2 10/2005 Karr et al.
6,954,646 B2 10/2005 Churt
6,954,735 B1 10/2005 Djupsjobacka et al.
6,957,072 B2 10/2005 Kangras et al.
6,975,959 B2 12/2005 Dietrich et al.
6,980,909 B2 12/2005 Root et al.
6,990,495 B1 1/2006 Grason et al.
6,999,779 B1 2/2006 Hashimoto
7,003,289 B1 2/2006 Kolls
7,009,556 B2 3/2006 Stewart
7,031,725 B2 4/2006 Rorabaugh
7,044,372 B2 5/2006 Okuda et al.
7,058,594 B2 6/2006 Stewart
7,076,255 B2 7/2006 Parupudi et al.
7,082,365 B2 7/2006 Sheha et al.
7,089,264 B1 8/2006 Guido et al.
7,096,029 B1 8/2006 Parupudi et al.
7,096,030 B2 8/2006 Huomo
7,103,470 B2 9/2006 Mintz
7,117,015 B2 10/2006 Scheinert et al.
7,120,469 B1 10/2006 Urakawa
7,123,189 B2 10/2006 Lalik et al.
7,123,926 B2 10/2006 Himmelstein
7,146,298 B2 12/2006 Motamedi et al.
7,149,503 B2 12/2006 Aarnio et al.
7,151,921 B2 12/2006 Otsuka
7,165,725 B2 1/2007 Casey
7,171,190 B2 1/2007 Ye et al.
7,181,189 B2 2/2007 Hotta et al.
7,187,997 B2 3/2007 Johnson
7,200,409 B1 4/2007 Ichikawa et al.
7,200,566 B1 4/2007 Moore et al.
7,213,048 B1 5/2007 Parupudi et al.
7,215,967 B1 5/2007 Kransmo et al.
7,236,883 B2 6/2007 Garin et al.
7,254,481 B2 8/2007 Yamada et al.
7,256,711 B2 8/2007 Sheha et al.
7,257,392 B2 8/2007 Tang et al.
7,260,378 B2 8/2007 Holland et al.
7,266,376 B2 9/2007 Nakagawa
7,269,601 B2 9/2007 Kinno et al.
7,271,765 B2 9/2007 Stilp et al.
7,272,403 B2 9/2007 Creamer et al.
7,272,404 B2 9/2007 Overy et al.
7,274,332 B1 9/2007 Dupray
7,274,939 B2 9/2007 Ruutu et al.
7,280,822 B2 10/2007 Fraccaroli
7,286,396 B2 10/2007 Yang et al.
7,295,556 B2 11/2007 Roese et al.
7,295,925 B2 11/2007 Breed et al.
7,298,327 B2 11/2007 Dupray et al.
7,299,008 B2 11/2007 Gluck
7,310,516 B1 12/2007 Vacanti
7,313,467 B2 12/2007 Breed et al.
7,319,412 B1 1/2008 Coppinger et al.
7,336,928 B2 2/2008 Paalasmaa et al.
7,336,949 B2 2/2008 Nasielski
7,339,496 B2 3/2008 Endo et al.
7,343,564 B2 3/2008 Othmer
7,349,706 B2 3/2008 Kim et al.
7,359,713 B1 4/2008 Tiwari
7,370,283 B2 5/2008 Othmer
7,373,246 B2 5/2008 O'Clair
7,386,396 B2 6/2008 Johnson
7,389,179 B2 6/2008 Jin et al.
7,392,017 B2 6/2008 Chu et al.
7,395,031 B1 7/2008 Ritter
7,418,402 B2 8/2008 McCrossin et al.
7,421,422 B1 9/2008 Dempster et al.
7,421,486 B1 9/2008 Parupudi et al.
7,426,437 B2 9/2008 Breed et al.
7,427,021 B2 9/2008 Kemper et al.
7,433,694 B2 10/2008 Morgan et al.
7,440,842 B1 10/2008 Vorona
7,466,235 B1 12/2008 Kolb et al.
7,483,944 B2 1/2009 Parupudi et al.
7,486,201 B2 2/2009 Kelly et al.
7,500,607 B2 3/2009 Williams
7,512,487 B1 3/2009 Golding et al.
7,522,927 B2 4/2009 Fitch et al.
7,525,484 B2 4/2009 Dupray et al.
7,536,388 B2 5/2009 Jung et al.
7,545,281 B2 6/2009 Richards et al.
7,558,696 B2 7/2009 Vilppula et al.
7,565,132 B2 7/2009 Ben Ayed
7,565,157 B1 7/2009 Ortega et al.
7,574,222 B2 8/2009 Sawada et al.
7,577,448 B2 8/2009 Pande et al.
7,587,345 B2 9/2009 Mann et al.
7,593,740 B2 9/2009 Crowley et al.
7,593,991 B2 9/2009 Friedman et al.
7,599,795 B1 10/2009 Blumberg et al.
7,603,233 B2 10/2009 Tashiro
7,606,580 B2 10/2009 Granito et al.
7,617,044 B2 11/2009 Lee
7,620,404 B2 11/2009 Chesnais et al.
7,623,848 B2 11/2009 Rosenfelt et al.
7,624,358 B2 11/2009 Kim et al.
7,647,174 B2 1/2010 Kwon
7,680,591 B2 3/2010 Nagaa et al.
7,689,916 B1 3/2010 Goel et al.
7,710,290 B2 5/2010 Johnson
7,711,478 B2 5/2010 Gluck
7,714,778 B2 5/2010 Dupray
7,729,691 B2 6/2010 Newville
7,739,040 B2 6/2010 Horvitz
7,743,074 B1 6/2010 Parupudi et al.
7,756,639 B2 7/2010 Colley et al.
7,768,395 B2 8/2010 Gold
7,792,273 B2 9/2010 Fano et al.
7,811,203 B2 10/2010 Unuma et al.
7,848,388 B2 12/2010 Tudosoiu

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,848,765 B2 12/2010 Phillips et al.
7,860,758 B2 12/2010 McCrossin et al.
7,890,123 B2 2/2011 Granito et al.
7,933,612 B2 4/2011 Counts et al.
7,933,929 B1 4/2011 McClendon et al.
7,941,188 B2 5/2011 Jung et al.
7,991,432 B2 8/2011 Silverbrook et al.
8,036,630 B2 10/2011 Park et al.
8,046,009 B2 10/2011 Bodmer et al.
2001/0018349 A1 8/2001 Kinnunen et al.
2001/0046884 A1 11/2001 Yoshioka
2002/0032035 A1 3/2002 Teshima
2002/0035493 A1 3/2002 Mozayeny et al.
2002/0035609 A1 3/2002 Lessard et al.
2002/0042266 A1 4/2002 Heyward et al.
2002/0046069 A1 4/2002 Mozayeny et al.
2002/0046077 A1 4/2002 Mozayeny et al.
2002/0046084 A1 4/2002 Steele et al.
2002/0055373 A1 5/2002 King et al.
2002/0067353 A1 6/2002 Kenyon et al.
2002/0077144 A1 6/2002 Keller et al.
2002/0087505 A1 7/2002 Smith et al.
2002/0091991 A1 7/2002 Castro
2002/0095486 A1 7/2002 Bahl
2002/0126146 A1 9/2002 Burns et al.
2002/0128773 A1 9/2002 Chowanic et al.
2002/0132625 A1 9/2002 Ogino et al.
2002/0140560 A1 10/2002 Altman et al.
2002/0160815 A1 10/2002 Patel et al.
2002/0167442 A1 11/2002 Taylor
2002/0173905 A1 11/2002 Jin et al.
2003/0014181 A1 1/2003 Myr
2003/0016804 A1 1/2003 Sheha et al.
2003/0032404 A1 2/2003 Wager et al.
2003/0055560 A1 3/2003 Phillips et al.
2003/0060212 A1 3/2003 Thomas
2003/0060215 A1 3/2003 Graham
2003/0060973 A1 3/2003 Mathews et al.
2003/0060976 A1 3/2003 Sato et al.
2003/0065934 A1 4/2003 Angelo et al.
2003/0069029 A1 4/2003 Dowling et al.
2003/0069683 A1 4/2003 Lapidot et al.
2003/0078054 A1 4/2003 Okuda
2003/0078055 A1 4/2003 Smith et al.
2003/0078057 A1 4/2003 Watanabe et al.
2003/0093217 A1 5/2003 Petzold et al.
2003/0096620 A1 5/2003 Ozturk et al.
2003/0100326 A1 5/2003 Grube et al.
2003/0100334 A1 5/2003 Mazzara, Jr.
2003/0101225 A1 5/2003 Han et al.
2003/0120423 A1 6/2003 Cochlovius et al.
2003/0134657 A1 7/2003 Norta et al.
2003/0140136 A1 7/2003 Nakamura
2003/0144793 A1 7/2003 Melaku et al.
2003/0148774 A1 8/2003 Naghian et al.
2003/0158655 A1 8/2003 Obradovich et al.
2003/0191578 A1 10/2003 Paulauskas et al.
2003/0236106 A1 12/2003 Master et al.
2004/0010358 A1 1/2004 Oesterling et al.
2004/0036649 A1 2/2004 Taylor
2004/0054428 A1 3/2004 Sheha et al.
2004/0059502 A1 3/2004 Levi et al.
2004/0068439 A1 4/2004 Elgrably
2004/0072577 A1 4/2004 Myllymaki et al.
2004/0073361 A1 4/2004 Tzamaloukas et al.
2004/0082351 A1 4/2004 Westman
2004/0083050 A1 4/2004 Biyani
2004/0093155 A1 5/2004 Simonds
2004/0104842 A1 6/2004 Drury et al.
2004/0110515 A1 6/2004 Blumberg et al.
2004/0128067 A1 7/2004 Smith
2004/0151151 A1 8/2004 Kubler et al.
2004/0158401 A1 8/2004 Yoon
2004/0158584 A1 8/2004 Necsoiu et al.
2004/0172409 A1 9/2004 James
2004/0176907 A1 9/2004 Nesbitt
2004/0180669 A1 9/2004 Kall
2004/0192299 A1 9/2004 Wilson et al.
2004/0198335 A1 10/2004 Campen
2004/0198379 A1 10/2004 Magee et al.
2004/0198397 A1 10/2004 Weiss
2004/0203569 A1 10/2004 Jijina et al.
2004/0203746 A1 10/2004 Knauerhase et al.
2004/0203836 A1 10/2004 Gorday et al.
2004/0203880 A1 10/2004 Riley
2004/0203909 A1 10/2004 Koster
2004/0215707 A1 10/2004 Fujita et al.
2004/0225436 A1 11/2004 Yoshihashi
2004/0228330 A1 11/2004 Kubler et al.
2004/0236504 A1 11/2004 Bickford et al.
2004/0242149 A1 12/2004 Luneau
2004/0246940 A1 12/2004 Kubler et al.
2004/0248586 A1 12/2004 Patel et al.
2004/0260939 A1 12/2004 Ichikawa et al.
2004/0263084 A1 12/2004 Mor et al.
2004/0264442 A1 12/2004 Kubler et al.
2005/0002419 A1 1/2005 Doviak et al.
2005/0004838 A1 1/2005 Perkowski et al.
2005/0009511 A1 1/2005 Bostrom et al.
2005/0027442 A1 2/2005 Kelley et al.
2005/0033515 A1 2/2005 Bozzone
2005/0037781 A1 2/2005 Ozugur et al.
2005/0039140 A1 2/2005 Chen
2005/0046584 A1 3/2005 Breed
2005/0071078 A1 3/2005 Yamada et al.
2005/0071702 A1 3/2005 Morisawa
2005/0075116 A1 4/2005 Laird
2005/0085272 A1 4/2005 Anderson et al.
2005/0091408 A1 4/2005 Parupudi et al.
2005/0096840 A1 5/2005 Simske
2005/0114021 A1 5/2005 Krull et al.
2005/0130677 A1 6/2005 Meunier et al.
2005/0134440 A1 6/2005 Breed
2005/0134578 A1 6/2005 Chambers et al.
2005/0149250 A1 7/2005 Isaac
2005/0153681 A1 7/2005 Hanson
2005/0176411 A1 8/2005 Taya
2005/0186954 A1 8/2005 Kenney
2005/0192025 A1 9/2005 Kaplan
2005/0197767 A1 9/2005 Nortrup
2005/0203698 A1 9/2005 Lee
2005/0221799 A1 10/2005 Tervo et al.
2005/0221808 A1 10/2005 Karlsson et al.
2005/0221843 A1 10/2005 Friedman et al.
2005/0222756 A1 10/2005 Davis et al.
2005/0222763 A1 10/2005 Uyeki
2005/0227709 A1 10/2005 Chang et al.
2005/0228860 A1 10/2005 Hamynen et al.
2005/0234637 A1 10/2005 Obradovich et al.
2005/0239477 A1 10/2005 Kim et al.
2005/0250440 A1 11/2005 Zhou et al.
2005/0256639 A1 11/2005 Aleksic et al.
2005/0286421 A1 12/2005 Janacek
2006/0009908 A1 1/2006 Tomita et al.
2006/0015249 A1 1/2006 Gieseke
2006/0022048 A1 2/2006 Johnson
2006/0025158 A1 2/2006 Leblanc et al.
2006/0029109 A1 2/2006 Moran
2006/0038719 A1 2/2006 Pande et al.
2006/0041374 A1 2/2006 Inoue
2006/0041377 A1 2/2006 Jung et al.
2006/0041378 A1 2/2006 Cheng et al.
2006/0056388 A1 3/2006 Livingwood
2006/0058955 A1 3/2006 Mehren
2006/0063539 A1 3/2006 Beyer
2006/0068809 A1 3/2006 Wengler et al.
2006/0069503 A1 3/2006 Suomela
2006/0085392 A1 4/2006 Wang et al.
2006/0094353 A1 5/2006 Neilson et al.
2006/0101005 A1 5/2006 Yang et al.
2006/0111122 A1 5/2006 Carlsan et al.
2006/0116137 A1 6/2006 Jung
2006/0148463 A1 7/2006 Zhu et al.
2006/0149461 A1 7/2006 Rowley

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0150119 A1 7/2006 Chesnais et al.
2006/0166679 A1 7/2006 Karaoguz et al.
2006/0168300 A1 7/2006 An et al.
2006/0172769 A1 8/2006 Oh
2006/0172778 A1 8/2006 Sundararajan et al.
2006/0179114 A1 8/2006 Deeds
2006/0180649 A1 8/2006 Casey
2006/0184978 A1 8/2006 Casey
2006/0195481 A1 8/2006 Arrouye et al.
2006/0199567 A1 9/2006 Alston
2006/0202819 A1 9/2006 Adamczyk et al.
2006/0211453 A1 9/2006 Schick
2006/0218209 A1 9/2006 Arrouye et al.
2006/0227047 A1 10/2006 Rosenberg
2006/0229802 A1 10/2006 Vertelney et al.
2006/0237385 A1 10/2006 Baker
2006/0247855 A1 11/2006 de Silva et al.
2006/0251034 A1 11/2006 Park
2006/0270421 A1 11/2006 Phillips et al.
2006/0271280 A1 11/2006 O'Clair
2006/0284767 A1 12/2006 Taylor
2006/0287824 A1 12/2006 Lin
2006/0291639 A1 12/2006 Radziewicz et al.
2006/0293029 A1 12/2006 Jha et al.
2006/0293083 A1 12/2006 Bowen
2007/0001875 A1 1/2007 Taylor
2007/0003040 A1 1/2007 Radziewicz et al.
2007/0005118 A1 1/2007 Carter et al.
2007/0005188 A1 1/2007 Johnson
2007/0005233 A1 1/2007 Pinkus et al.
2007/0006098 A1 1/2007 Krumm et al.
2007/0008515 A1 1/2007 Otani et al.
2007/0010942 A1 1/2007 Bill
2007/0016362 A1 1/2007 Nelson
2007/0027614 A1 2/2007 Reeser et al.
2007/0027628 A1 2/2007 Geelen
2007/0042790 A1 2/2007 Mohi et al.
2007/0055684 A1 3/2007 Steven
2007/0060328 A1 3/2007 Zrike et al.
2007/0061245 A1 3/2007 Ramer et al.
2007/0061301 A1 3/2007 Ramer et al.
2007/0061363 A1 3/2007 Ramer et al.
2007/0071114 A1 3/2007 Sanderford et al.
2007/0073480 A1 3/2007 Singh
2007/0073719 A1 3/2007 Ramer et al.
2007/0087726 A1 4/2007 McGary et al.
2007/0093258 A1 4/2007 Steenstra et al.
2007/0106465 A1 5/2007 Adam et al.
2007/0115868 A1 5/2007 Chen et al.
2007/0124043 A1 5/2007 Ayoub et al.
2007/0124058 A1 5/2007 Kitagawa et al.
2007/0124066 A1 5/2007 Kikuchi
2007/0127439 A1 6/2007 Stein
2007/0127661 A1 6/2007 Didcock
2007/0129888 A1 6/2007 Rosenberg
2007/0130153 A1 6/2007 Nachman et al.
2007/0135136 A1 6/2007 Ische
2007/0135990 A1 6/2007 Seymour et al.
2007/0142026 A1 6/2007 Kuz et al.
2007/0149212 A1 6/2007 Gupta et al.
2007/0150320 A1 6/2007 Huang
2007/0153983 A1 7/2007 Bloebaum et al.
2007/0153984 A1 7/2007 Bloebaum et al.
2007/0153986 A1 7/2007 Bloebaum et al.
2007/0155360 A1 7/2007 An
2007/0156326 A1 7/2007 Nesbitt
2007/0162224 A1 7/2007 Luo
2007/0179854 A1 8/2007 Ziv et al.
2007/0184855 A1 8/2007 Klassen
2007/0191029 A1 8/2007 Zarem et al.
2007/0200713 A1 8/2007 Weber et al.
2007/0204218 A1 8/2007 Weber et al.
2007/0206730 A1 9/2007 Polk
2007/0208492 A1 9/2007 Downs et al.
2007/0208497 A1 9/2007 Downs et al.
2007/0208498 A1 9/2007 Barker et al.
2007/0218925 A1 9/2007 Islam et al.
2007/0219706 A1 9/2007 Sheynblat
2007/0229549 A1 10/2007 Dicke et al.
2007/0232272 A1 10/2007 Gonsalves et al.
2007/0232326 A1 10/2007 Johnson
2007/0233387 A1 10/2007 Johnson
2007/0238491 A1 10/2007 He
2007/0243853 A1 10/2007 Bumiller et al.
2007/0247435 A1 10/2007 Benko et al.
2007/0254676 A1 11/2007 Pedigo et al.
2007/0259674 A1 11/2007 Neef et al.
2007/0260751 A1 11/2007 Meesseman
2007/0266116 A1 11/2007 Rensin et al.
2007/0271328 A1 11/2007 Geelen et al.
2007/0276586 A1 11/2007 Jeon et al.
2007/0276587 A1 11/2007 Johnson
2007/0276596 A1 11/2007 Solomon et al.
2007/0281664 A1 12/2007 Kaneko et al.
2007/0282521 A1 12/2007 Broughton
2007/0282565 A1 12/2007 Bye et al.
2007/0290920 A1 12/2007 Shintai et al.
2007/0299601 A1 12/2007 Zhao et al.
2008/0004789 A1 1/2008 Horvitz et al.
2008/0004791 A1 1/2008 Sera
2008/0004802 A1 1/2008 Horvitz
2008/0005104 A1 1/2008 Flake et al.
2008/0005301 A1 1/2008 Li et al.
2008/0015422 A1 1/2008 Wessel
2008/0021632 A1 1/2008 Amano
2008/0024360 A1 1/2008 Taylor
2008/0024364 A1 1/2008 Frederick Taylor
2008/0027636 A1 1/2008 Tengler et al.
2008/0030308 A1 2/2008 Johnson
2008/0032703 A1 2/2008 Krumm et al.
2008/0032721 A1 2/2008 MacDonald et al.
2008/0045234 A1 2/2008 Reed
2008/0046176 A1 2/2008 Jurgens
2008/0052407 A1 2/2008 Baudino et al.
2008/0065311 A1 3/2008 Bauchot et al.
2008/0070593 A1 3/2008 Altman et al.
2008/0071466 A1 3/2008 Downs et al.
2008/0082254 A1 4/2008 Huhtala et al.
2008/0085727 A1 4/2008 Kratz
2008/0086240 A1 4/2008 Breed
2008/0088486 A1 4/2008 Rozum et al.
2008/0091347 A1 4/2008 Tashiro
2008/0096518 A1 4/2008 Mock et al.
2008/0097698 A1 4/2008 Arnold-Huyser et al.
2008/0098090 A1 4/2008 Geraci et al.
2008/0104634 A1 5/2008 Gajdos et al.
2008/0109153 A1 5/2008 Gueziec
2008/0113672 A1 5/2008 Karr et al.
2008/0129528 A1 6/2008 Guthrie
2008/0132243 A1 6/2008 Spalink et al.
2008/0132251 A1 6/2008 Altman et al.
2008/0132252 A1 6/2008 Altman et al.
2008/0140308 A1 6/2008 Yamane et al.
2008/0140520 A1 6/2008 Hyder et al.
2008/0153512 A1 6/2008 Kale et al.
2008/0153513 A1 6/2008 Flake et al.
2008/0155453 A1 6/2008 Othmer
2008/0160956 A1 7/2008 Jackson et al.
2008/0161034 A1 7/2008 Akiyama
2008/0167083 A1 7/2008 Wyld et al.
2008/0167796 A1 7/2008 Narayanaswami
2008/0167811 A1 7/2008 Geelen
2008/0172173 A1 7/2008 Chang et al.
2008/0172374 A1 7/2008 Wolosin et al.
2008/0176545 A1 7/2008 Dicke et al.
2008/0177793 A1 7/2008 Epstein et al.
2008/0178116 A1 7/2008 Kim
2008/0186162 A1 8/2008 Rajan et al.
2008/0189033 A1 8/2008 Geelen et al.
2008/0194273 A1 8/2008 Kansal et al.
2008/0200142 A1 8/2008 Abdel-Kader et al.
2008/0207167 A1 8/2008 Bugenhagen
2008/0225779 A1 9/2008 Bragiel et al.
2008/0227473 A1 9/2008 Haney

(56) **References Cited**

U.S. PATENT DOCUMENTS

2008/0233919	A1	9/2008	Kenney
2008/0248815	A1	10/2008	Busch
2008/0249667	A1	10/2008	Horvitz et al.
2008/0268876	A1	10/2008	Gelfand et al.
2008/0271072	A1	10/2008	Rothschild et al.
2008/0284642	A1	11/2008	Seacat et al.
2008/0287124	A1	11/2008	Karabinis
2008/0288166	A1	11/2008	Onishi
2008/0293397	A1	11/2008	Gajdos et al.
2008/0310850	A1	12/2008	Pederson et al.
2008/0318550	A1	12/2008	DeAtley
2008/0319644	A1	12/2008	Zehler
2008/0319652	A1	12/2008	Moshfeghi
2009/0003659	A1	1/2009	Forstall et al.
2009/0005005	A1	1/2009	Forstall et al.
2009/0005018	A1	1/2009	Forstall et al.
2009/0005021	A1	1/2009	Forstall et al.
2009/0005068	A1	1/2009	Forstall et al.
2009/0005070	A1	1/2009	Forstall et al.
2009/0005071	A1	1/2009	Forstall et al.
2009/0005072	A1	1/2009	Forstall et al.
2009/0005076	A1	1/2009	Forstall et al.
2009/0005080	A1	1/2009	Forstall et al.
2009/0005082	A1	1/2009	Forstall et al.
2009/0005964	A1	1/2009	Forstall et al.
2009/0005965	A1	1/2009	Forstall et al.
2009/0005975	A1	1/2009	Forstall et al.
2009/0005978	A1	1/2009	Forstall et al.
2009/0005981	A1	1/2009	Forstall et al.
2009/0006336	A1	1/2009	Forstall et al.
2009/0030605	A1	1/2009	Breed
2009/0031006	A1	1/2009	Johnson
2009/0033540	A1	2/2009	Breed et al.
2009/0042585	A1	2/2009	Matsuda
2009/0089706	A1	4/2009	Furches et al.
2009/0098857	A1	4/2009	DeAtley
2009/0121927	A1	5/2009	Moshfeghi
2009/0177385	A1	7/2009	Matas et al.
2009/0182492	A1	7/2009	Alten
2009/0197612	A1	8/2009	Kiiskinen
2009/0201850	A1	8/2009	Davis
2009/0215469	A1	8/2009	Fisher
2009/0228961	A1	9/2009	Wald et al.
2009/0234743	A1	9/2009	Wald et al.
2009/0259573	A1	10/2009	Cheng et al.
2009/0271271	A1	10/2009	Johnson
2009/0281724	A1	11/2009	Blumenberg et al.
2009/0286549	A1	11/2009	Sazegari et al.
2010/0076818	A1	3/2010	Peterson et al.
2010/0082820	A1	4/2010	Furukawa
2010/0106397	A1	4/2010	Van Essen
2010/0131584	A1	5/2010	Johnson
2010/0173647	A1	7/2010	Sheynblat
2010/0207782	A1	8/2010	Johnson
2011/0051658	A1	3/2011	Jin et al.

FOREIGN PATENT DOCUMENTS

CA	2287596	4/2000
CA	2432239	12/2004
DE	3 621 456	1/1988
DE	4437360	4/1996
DE	19506890	8/1996
DE	19914257	3/1999
DE	10 141 695	3/2003
EP	0 288 068	7/1992
EP	0 633 452	1/1995
EP	0 745 867	12/1996
EP	0 762 362	3/1997
EP	0 763 749	3/1997
EP	0 786 646	7/1997
EP	785535	7/1997
EP	0 809 117	11/1997
EP	0 813 072	12/1997
EP	0 699 330 B1	4/1998
EP	0 908 835	4/1999
EP	0 997 808	5/2000
EP	1 083 764	3/2001
EP	1 251 362	10/2002
EP	1 300 652	4/2003
EP	1 457 928	9/2004
EP	1 469 287	10/2004
EP	1 496 338	1/2005
EP	1 770 956 A1	9/2005
EP	1 465 041	2/2006
EP	1 659 817	5/2006
EP	1 672 474	6/2006
EP	1 790 947	5/2007
EP	1 860 904	11/2007
EP	1 933 249	8/2008
EP	1 975 567	10/2008
FR	2730083	8/1996
FR	2754093	4/1998
FR	2272911	6/1999
FR	2810183	12/2001
GB	2 278 196	11/1994
GB	2 322 248	8/1998
GB	2 359 888	5/2001
GB	2 407 230 A	4/2005
JP	62142215	6/1987
JP	05-071974	3/1993
JP	06-525189	5/1994
JP	2007-221433	5/1994
JP	08-069436	3/1996
JP	09-054895	2/1997
JP	09-098474	4/1997
JP	9-113288	5/1997
JP	09-153125	6/1997
JP	9-062993	7/1997
JP	09-200850	7/1997
JP	9-210710	8/1997
JP	9-319300	12/1997
JP	10-021259	1/1998
JP	11-234736	8/1999
JP	2000-163379	6/2000
JP	2001-008270	1/2001
JP	2001-160063	6/2001
JP	2002-310680	10/2002
JP	10-030933	2/2003
JP	2003-228532	8/2003
JP	2004-045054	2/2004
JP	2004-219146	7/2004
JP	2004-362271	12/2004
JP	2005-106741	4/2005
JP	2005-182146	7/2005
JP	2005-241519	9/2005
JP	2005/277764	10/2005
JP	2006-112338	4/2006
JP	2006-184007	7/2006
JP	2006-270889	10/2006
JP	2006-279838	10/2006
JP	2007-033220	2/2007
JP	2007-033331	2/2007
JP	2007-033368	2/2007
JP	2007-127439	5/2007
JP	2007-147439	6/2007
JP	2007-201699	8/2007
JP	2007-240400	9/2007
JP	2007-259291	10/2007
JP	2007-271299	10/2007
JP	2007-304009	11/2007
JP	2008-058917	3/2008
JP	2008-129774	6/2008
KR	2004-102440	12/2004
KR	2005-096746	10/2005
TW	200426387	12/2004
WO	WO 93/20546	10/1993
WO	WO 94/08250	4/1994
WO	WO 97/07467	2/1997
WO	WO 97/24577	7/1997
WO	WO 97/41654	11/1997
WO	WO 98/03951	1/1998
WO	WO 98/07112	2/1998

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO 98/54682	12/1998
WO	WO 99/16036	4/1999
WO	WO 99/44183	9/1999
WO	WO 99/61934	12/1999
WO	WO 01/31966	5/2001
WO	WO 01/37597	5/2001
WO	WO 02/33533	4/2002
WO	WO 02/054813	7/2002
WO	WO 03/023593	3/2003
WO	WO 03/096055	11/2003
WO	WO 2004/008792	1/2004
WO	WO 2004/021730	3/2004
WO	WO 2004/034194	4/2004
WO	WO 2004/061576	7/2004
WO	WO 2004/076977	9/2004
WO	WO 2005-006258	1/2005
WO	WO 2005/084052	9/2005
WO	WO 2006/065856	6/2006
WO	WO 2006/113125	10/2006
WO	WO 2007/027065	3/2007
WO	WO 2007/052285	5/2007
WO	WO 2008/051929	5/2008
WO	WO 2008/085740	7/2008
WO	WO 2009/002942	12/2008

OTHER PUBLICATIONS

Challe, "CARMINAT—An Integrated information and guidance system," Vehicle Navigation and Information Systems Conference, Oct. 20-23, 1991, Renault—Direction de la Recherche, Rueil-Malmaison, France.

Pungel, "Traffic control—beat the jam electronically," Funkschau, 1988, 18:43-45 (w/English translation).

Rillings and Betsold, "Advanced driver information systems," Vehicular Technology, IEEE Vehicular Technology Society, 1991, 40:31-40.

Tsuzawa and Okamoto, "Advanced Mobile Traffic Information and Communication System," First Vehicle Navigation and Information Systems Conference, Sep. 11-13, 1989, Toronto, Canada, Abstract only.

Wong, "GPS: making roads safer and solving traffic tangles," Asia Engineer, 1995, 23(9):31-32.

Ayatsuka et al., "UbiquitousLinks: Hypermedia Links Embedded in the Real World, Technical Report of Information Processing Society, 96-HI-67," Information Processing Society of Japan, Jul. 11, 1996, 96(62):23-30.

Nagao et al., Walk Navi: A Location-Aware Interactive Navigation/Guideline System and Software III, First edition, pp. 9-48, published by Kindai-Kagaku-Sya Co. Ltd., Dec. 10, 1995.

Benefon ESC! GSM+GPS Personal Navigation Phone, benefon.com, Copyright 2001, 4 pages.

Freundschuh, "Does 'Anybody' Really Want (or Need) Vehicle Navigation Aids?" First Vehicle Navigation and Information System Conference, Sep. 11-13, 1989, Toronto, Canada, 5 pages.

Gould, "The Provision of Usable Navigation Assistance: Considering Individual Cognitive Ability," First Vehicle Navigation and Information System Conference, Sep. 11-13, 1989, Toronto, Canada, 7 pages.

Mark, "A Conceptual Model for Vehicle Navigation Systems," First Vehicle Navigation and Information System Conference, Sep. 11-13, 1989, Toronto, Canada, 11 pages.

Wheeler et al., "Development of Human Factors Guidelines for Advanced Traveler Information Systems and Commercial Vehicle Operations: Task Analysis of ATIS/CVO Functions," US Dept. Transportation Federal Highway Administration Research and Development, Publication No. FHWA-RD-95-176, Nov. 1996, 124 pages.

Miller et al., "Integrating Hierarchical Navigation and Querying: A User Customizable Solution," ACM Multimedia Workshop on Effective Abstractions in Multimedia Layout, Presentation, and Interaction, San Francisco, CA, Nov. 1995, 8 pages.

Hoogenraad, "Location Dependent Services," 3rd AGILE Conference on Geographic Information Science, Helsinki/Espoo, Finland, May 25-27, 2000, pp. 74-77.

Bonsignore, "A Comparative Evaluation of the Benefits of Advanced Traveler Information System (ATIS) Operational Tests," MIT Masters Thesis, Feb. 1994, 140 pages.

Noonan and Shearer, "Intelligent Transportation Systems Field Operational Test Cross-Cutting Study Advance Traveler Information systems," Intelligent Transportation Systems Field Operational Test Cross-Cutting Study, Sep. 1998, 26 pages.

Burnett, "Usable Vehicle Navigation Systems: Are We There Yet?" Vehicle Electronic Systems 2000, Jun. 29-30, 2000, 3.1.1-3.1.12.

Khattak et al., "Bay Area ATIS Testbed Plan," Research Reports, California Partners for Advanced Transit and Highways (PATH), Institute of Transportation Studies, UC Berkeley, Jan. 1, 1992, 83 pages.

Yim et al., "Travinto Field Operational Test: Work Plan for the Target, Network, and Value Added Reseller (VAR) Customer Studies," Working Papers, California Partners for Advanced Transit and Highways (PATH), Institute of Transportation Studies, UC Berkeley, Apr. 1, 1997, 49 pages.

Mahmassani et al., "Providing Advanced and Real-Time Travel/Traffic Information to Tourists," Center for Transportation Research, Bureau of Engineering Research, The University of Texas at Austin, Oct. 1998, 15 pages.

"New Handsets Strut Their Stuff at Wireless '99," Internet: URL: http://findarticles.com/p/articles/mi_m0BMD/is_1999_Feb_11/ai_n27547656/ downloaded from Internet on Feb. 11, 1999, 3 pages.

"School Buses to Carry Noticom's First Application," Internet: URL: http://findarticles.com/p/articles/mi_m0BMD/is_1999_Feb_17/ai_n27547754/ downloaded from the Internet on Feb. 17, 1999, 2 pages.

Green et al., "Suggested Human Factors Design Guidelines for Driver Information Systems," Technical Report UMTRI-93-21, Nov. 1993, 119 pages.

Tijerina et al., "Driver Workload Assessment of Route Guidance System Destination Entry While Driving: A Test Track Study," Proceedings of the 5th ITS World Congress, Oct. 12-16, 1998, Seoul, Korea, 9 pages.

Muraskin, "Two-Minute Warnings for School Bus Riders," Internet: URL: http://www.callcentermagazine.com/shared/printableArticle.jhtml;jsessionid=PQH1SZXW . . . Jul. 1, 1999, 3 pages.

Ni and Deakin, "On-Board Advanced Traveler Information Systems," Dec. 1, 2002, 10 pages.

Serafin et al., "Functions and Features of Future Driver Information Systems," Technical Report UMTRI-91-16, May 1991, 104 pages.

Shekhar and Liu, "Genesis and Advanced Traveler Information Systems (ATIS): Killer Applications for Mobile Computing?" NSF Mobidata Workshop on Mobile and Wireless Information Systems, Nov. 1994, 20 pages.

"LaBarge in joint venture on bus system," Internet: URL: http://www.bizjournals.com/stlouis/stories/1998/08/10/focus2.html?t-printable, Aug. 7, 1998, 1 page.

Clarke et al., "Development of Human Factors Guidelines for Advanced Traveler Information Systems (ATIS) and Commercial Vehicle Operations (CVO): Comparable Systems Analysis," U.S. Department of Transportation Federal Highway Administration, Publication No. FHWA-RD-95-197, Dec. 1996, 212 pages.

Zubac and Strahonja, "Theory and Development of an Online Navigation System," 18th International Conference on Information and Intelligent Systems, University of Zagreb, Sep. 12-14, 2007.

Brown, "The stick-e document: a framework for creating context-aware applications," Electronic Publishing, 1995, 8:259-272.

Brown, "Triggering Information by Context," Personal Technologies, 1998, 2:18-27.

Dey et al., "CyberDesk: a framework for providing self-integrating context-aware services," Knowledge-Based Systems, 1998, 11:3-13.

Hodes and Katz, "Composable ad hoc location-based services for heterogeneous mobile clients," Wireless Networks, 1999, 5:411-427.

Kreller et al., "A Mobile-Aware City Guide Application," ACTS Mobile Communication Summit, 1998, Rhodes, Greece, 7 pages.

Lusky et al., "Mapping the Present," ColoradoBiz, Nov. 1999, 26(11):16-17.

(56) **References Cited**

OTHER PUBLICATIONS

McCarthy and Meidel, "ActiveMap: A Visualization Tool for Location Awareness to Support Informal Interactions," HUC '99, LNCS 1707, 1999, pp. 158-170.
O'Grady et al., "A Tourist-Centric Mechanism for Interacting with the Environment," Proceedings of the First International Workshop on Managing Interactions in Smart Environments (MANSE '99), Dublin, Ireland, Dec. 1999, pp. 56-67.
Pascoe et al., "Developing Personal Technology for the Field," Personal Technologies 1998, 2:28-36.
Tarumi et al., "Public Applications of SpaceTag and Their Impacts," Digital Cities, LNCS 1765, 2000, 350-363.
Tebbutt, "Dial your way out of the woods," The Australian, Feb. 2000, 1 page.
Tso et al., "Always On, Always Connected Mobile Computing," Mobile Communications Operation—Mobile Handheld Products Group, 1996, 918-924.
Wang and Lin, "Location Aware Information Agent over WAP," Tamkang Journal of Science and Engineering, 2000, 3(2):107-115.
"3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN; Working Group 2 (WG2); Report on Location Services (LCS)," 3G TR 25.923 v.1.0.0, Apr. 1999, 45 pages.
"Report on Location Service feature (LCS) 25.923 v1.0.0," TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3), Berlin, May 25-28, 1999, 45 pages.
"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Functional stage 2 description of location services in UMTS," 3G TS 23.171 v.1.1.0, Nov. 1999, 42 pages.
"3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Stage 2 Functional Specification of Location Services in UTRAN," 3G TS 25.305 v.3.1.0, Mar. 2000, 45 pages.
"Enabling UMTS / Third Generation Services and Applications," No. 11 Report from the UMTS Forum, Oct. 2000, 72 pages.
"3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN; Working Group 2 (WG2); Report on Location Services and Applications," TS RAN R2.03 V0.1.0, Apr. 1999, 43 pages.
"Revised CR to 09/31 on work item LCS," ETSI SMG3 Plenary Meeting #6, Nice, France, Dec. 13-15, 1999. 18 pages.
Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Service description, Stage 1 (GSM 02.71) ETSI, Apr. 1999, 22 pages.
Akerblom, "Tracking Mobile Phones in Urban Areas," Goteborg University Thesis, Sep. 2000, 67 pages.
Borsodi, "Super Resolution of Discrete Arrivals in a Cellular Geolocation System," University of Calgary Thesis, Apr. 2000, 164 pages.
Abowd et al., "Context-awareness in wearable and ubiquitous computing," 1st International Symposium on Wearable Computers, Oct. 13-14, 1997, Cambridge, MA, 9 pages.
Balsiger et al., "MOGID: Mobile Geo-depended Information on Demand," Workshop on Position Dependent Information Services (W3C-WAP), 2000, 8 pages.
Cheverst et al., "Architectural Ideas for the Support of Adaptive Context-Aware Applications," Proceedings of Workshop on Infrastructure for Smart Devices—How to Make Ubiquity an Actuality, HUC'00, Bristol, Sep. 2000, 3 pages.
Cheverst et al., "The Role of Connectivity in Supporting Context-Sensitive Applications," HUC'99, LNCS 1707, 1999, pp. 193-209.
Efstratiou and Cheverst, "Reflection: A Solution for Highly Adaptive Mobile Systems," 2000 Workshop on Reflective Middleware, 2000, 2 pages.
Cheverst et al., "The Support of Mobile-Awareness in Collaborative Groupware," Personal Technologies, 1999, 3:33-42.
Cheverst et al., "Design of an Object Model for a Context Sensitive Tourist Guide," Computers and Graphics, 1999, 23(6): 883-891.
Cheverst et al., "Developing Interfaces for Collaborative Mobile Systems," 1999, 15 pages.
Cheverst et al., "Experiences of Developing and Deploying a Context-Aware Tourist Guide: The Guide Project," 2000, pp. 20-31.
Cheverst et al., "Exploiting Context to Support Social Awareness and Social Navigation," SIGGROUP Bulleting Dec. 2000, 21(3):43-48.
Cheverst et al., "Services to Support Consistency in Mobile Collaborative Applications," Proc. 3rd International Workshop on Services in Distributed Networked Environments, 1996, 8 pages.
Cheverst et al., "Sharing (Location) Context to Facilitate Collaboration Between City Visitors," 2000, 8 pages.
Cheverst et al., "Supporting Collaboration in Mobile-aware Groupware," Workshop on Handheld CSCW, 1998, 6 pages.
Change Request for "U.S. specific Emergency Services requirements included as an informative annex," Nov. 29, 1999, 2 pages.
Costa et al., "Experiments with Reflective Middleware," Proceedings of the ECOOP'98 Workshop on Reflective Object-Oriented Programming and Systems, ECOOP'98 Workshop Reader, 1998, 13 pages.
Davies et al., "L2imbo: A distributed systems platform for mobile computing," Mobile Networks and Applications, 1998, 3:143-156.
Davies et al., "'Caches in the Air': Disseminating Tourist Information in the Guide System," Second IEEE Workshop on Mobile Computer Systems and Applications, Feb. 25-26, 1999, 9 pages.
Dix et al., "Exploiting Space and Location as a Design Framework for Interactive Mobile Systems," ACM Transactions on Computer-Human Interaction (TOCHI)—Special issue on human-computer interaction with mobile systems, 2000, 7(3):285-321.
Drane et al., "Positioning GSM Telephones," IEEE Communications Magazine, Apr. 1998, pp. 46-59.
Drone and Rizos, "Role of Positioning Systems in ITS," Positioning Systems in Intelligent Transportation Systems, Dec. 1997, pp. 312, 346-349.
Efstratiou et al., "Architectural Requirements for the Effective Support of Adaptive Mobile Applications," 2000, 12 pages.
"Estonian operator to launch world's first Network-based location services," Ericsson Press Release, Oct. 11, 1999, 2 pages.
Fischer et al., "System Performance Evaluation of Mobile Positioning Methods," IEEE, Aug. 2002, pp. 1962-1966.
Flinn and Satyanarayanan, "PowerScope: A Tool Profiling the Energy Usage of Mobile Applications," Proc. WMCSA '99 Second IEEE Workshop on Mobile Computing Systems and Applications, Feb. 25-26, 1999, 9 pages.
French and Driscoll, "Location Technologies for ITS Emergency Notification and E911," Proc. 1996 National Technical Meeting of The Institute of Navigation, Jan. 22-24, 1996, pp. 355-359.
Friday et al., "Developing Adaptive Applications: The MOST Experience," J. Integrated Computer-Aided Engineering, 1999, pp. 143-157.
Gunnarsson et al., "Location Trial System for Mobile Phones," IEEE, 1998, pp. 2211-2216.
Jose and Davies, "Scalable and Flexible Location-Based Services for Ubiquitous Information Access," HUC'99, LNCS 1707, 1999, pp. 52-66.
Klinec and Nolz, "Nexus-Positioning and Communication Environment for Spatially Aware Applications," IAPRS, Amsterdam, 2000, 7 pages.
Kovacs et al., "Adaptive Mobile Access to Context-aware Services," Proc. ASAMA '99 Proc. First International Symposium on Agent Systems and Applications Third International Symposium on Mobile Agents, IEEE Computer Society Washington, DC, 1999, 12 pages.
Kreller et al., "UMTS: A Middleware Architecture and Mobile API/Approach," IEEE Personal Communications, Apr. 1998, pp. 32-38.
Kugler and Lechner, "Combined Use of GPS and LORAN-C in Integrated Navigation Systems," Fifth International Conference on Satellite Systems for Mobile Communications and Navigation, London, UK, May 13-15, 1996, pp. 199-207.
Kyriazakos et al., "Optimization of the Handover Algorithm based on the Position of the Mobile Terminals," Communications and Vehicular Technology, Oct. 2000, pp. 155-159.
Leonhardt and Magee, "Multi-Sensor Location Tracking," MOBICOM 98, Dallas, TX, pp. 203-214.
Leonhardt and Magee, "Towards a general location service for mobile environments," Proc. Third International Workshop on Services in Distributed and Networked Environments, Jun. 3-4, 1996, 8 pages.

(56) **References Cited**

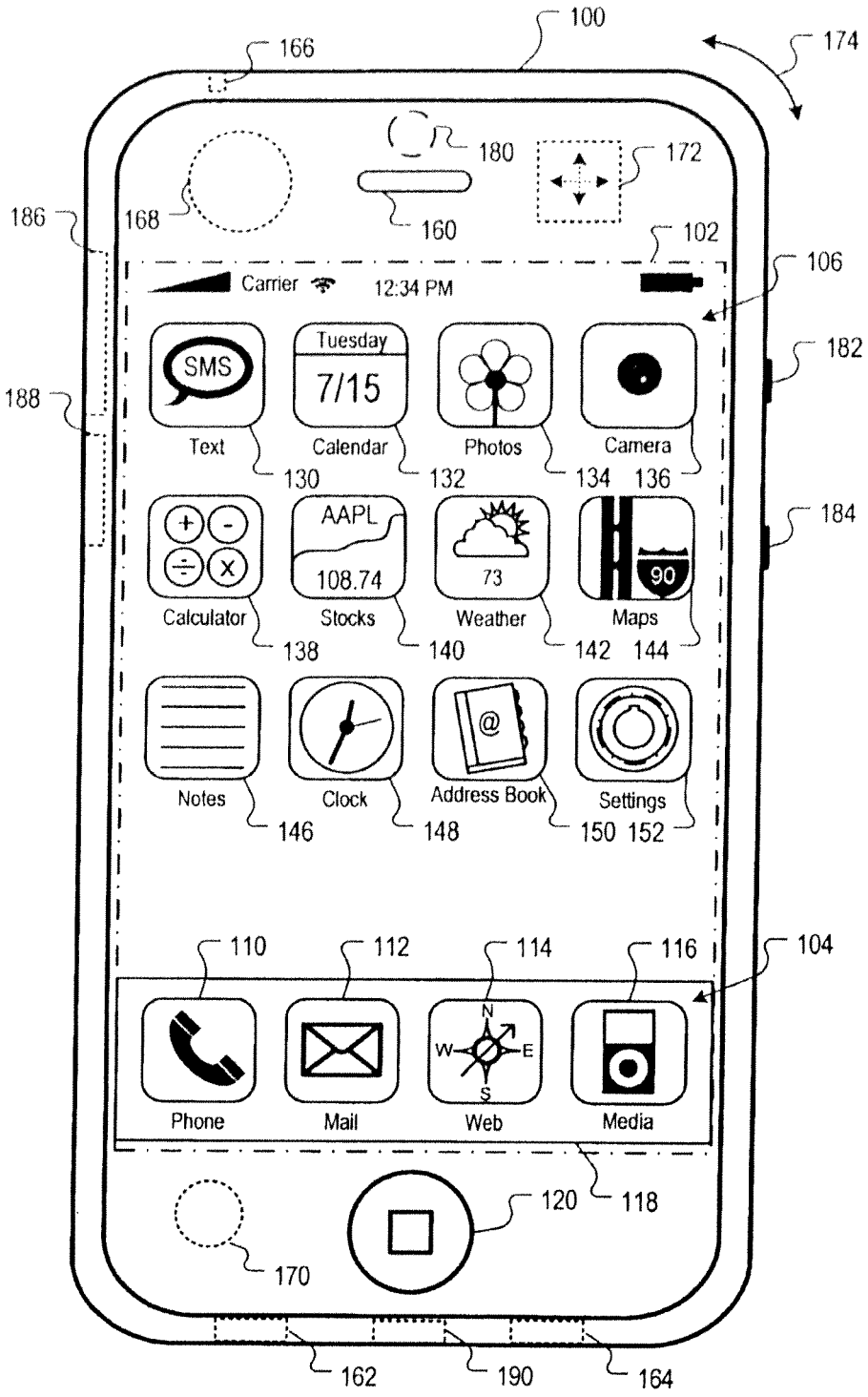
OTHER PUBLICATIONS

Long et al., "Rapid Prototyping or Mobile Context-Aware Applications: The Cyberguide Case Study," MobiCom '96, 1996, 11 pages.
Yokote, "The Apertos Reflective Operating System: The Concept and Its Implementation," OOPSLA'92, pp. 414-434.
Popescu-Zeletin et al., "Applying Location-Aware Computing for Electronic Commerce: Mobile Guide," Proc. 5th Conference on Computer Communications, AFRICOM-CCDC'98,Oct. 20-22, 1998, 14 pages.
Zhao, "Mobile Phone Location Determination and Its Impact on Intelligent Transportation Systems," IEEE Transactions on Intelligent Transportation Systems, Mar. 2000, 1(1):55-64.
Microsoft Outlook 2003 User's Guide, http://opan.admin.ufl.edu/user_guides/outlook2003.htm. Aug. 2004, 17 pages.
"Error: could not find a contact with this e-mail address." Outlookbanter.com. Dec. 2006, 12 pages.
Authorized officer Dorothee Mulhausen, International Preliminary Report on Patentability in PCT/US2009/41298 mailed Nov. 25, 2010, 8 pages.
Feddema et al., "Cooperative Sentry Vehicles and Differential GPS Leapfrog," 2000, United States Department of Energy, pp. 1-12.
Dalrymple, "Google Maps adds locator, but not for iPhone," [online] [Retrieved Nov. 30, 2007]; Retrieved from the Internet URL: http://news.yahoo.com/s/macworld/20071130/tc_macworld/googlemaps20071130_0&printer=1;_ylt=Auvf3s6LQK_pOaJ1b954T_DQn6gB; 1 page.
Maxwell et al., "Alfred: The Robot Waiter Who Remembers You," *AIII Technical Report WS-99-15*, 1999, 12 pages.
Shibata et al., "Development and Integration of Generic Components for a Teachable Vision-Based Mobile Robot," *IEEE/ASME Transactions on Mechatronics*, 1996, 1(3):230-236.
Yogesh C. Rathod, Third Party Submission in U.S. Appl. No. 12/233,358 mailed Mar. 30, 2010, 12 pages.
Drane et al., "The accurate location of mobile telephones", Third Annual World Congress on Intelligent Transport Systems, Orlando, Florida, Oct. 1996.
"Travel Time Data Collection Handbook—Chapter 5: Its Probe Vehicle Techniques", FHWA-PL-98-035 Report, Department of Transport, University of Texas, Mar. 1998; [online] [Retrieved from the Internet at http://www.fhwa.dot.gov/ohim/handbook/chap5.pdf.
Ygnace et al., "Travel Time Estimation on the San Francisco Bay Area Network Using Cellular Phones as Probes", Working Paper, Institute of Transportation Studies, University of California, Berkeley, 2000.
Wang et al., "A Unified Vehicle Supervising and Traffic Information System", IEEE, 1996, pp. 968-972.
Budka et al., "A Bayesian method to Improve Mobile Geolocation Accuracy", IEEE, 2002, pp. 1021-1025.
Yamamoto et al., "Position Location Technologies Using Signal Strength in Cellular Systems", IEEE, 2001, pp. 2570-2575.
International Search Report and Written Opinion, dated Oct. 1, 2009, issued in PCT/US2009/041298.
RD 409052, Research Disclosure Alerting Abstract, "Location dependent information for satellite based vehicle communication—required application of Global Position System (GPS) to automatically extract relevant portions of data package as vehicle changes position," May 10, 1998, 1 page.
Dibdin, Peter, "Where are mobile location based services?", Dec. 14, 2001, pp. 1-8.
Cho et al. A Traveler Information Service Structure in Hybrid T-DMB and Cellular Communication Network, Broadcast Systems Research Group, IEEE, (2006), pp. 747-750.
"27 Countries in your pocket"; [online] [Retrieved on Sep. 29, 2005] Retrieved from the Internet <URL: http://www.mio-tech.be/en/printview/press-releases-2005-09-29.htm; 1 page.
"Animated Transition"; [online] [Retrieved on Oct. 16, 2006] Retrieved from the Internet <URL: http://designinterfaces.com/Animated_Transition; 2 pages.
"DaimlerCrysler Guide5 Usecases Overview Map", 1 page (no reference date).
"International Roaming Guide—Personal Experience(s) from Customer and Community Member"; [online] [Retrieved Jun. 26, 2006] Retrieved from the Internet <URL: http://forums.cingular.com/eng/board/message?board.id=1185; 6 pages.
"iPhone Software/Hardware Hack: LocoGPS—GPS Add-on for the iPhone"; [online] [Retrieved on Dec. 25, 2007] Retrieved from the Internet <URL: http://www.iphonehacks.com/iphone_applications/index.html; 41 pages.
"Mio 269+ Users Manula"; 2005; 44 pages.
"New program for mobile blogging for PocketPC released: My Blog"; [online] [Retrieved on Apr. 5, 2006]; Retrieved from the Internet, URL: http://msmobiles.com/news.php/4067.html.
"Numbering and Dialing Plan within the United States", Alliance for Telecommunications Industry Solutions; 2005; 17 pages.
Review Guide—Google Maps for mobile (beta); Google; 2006; 7 pages.
"User-centered design of mobile solutions", NAMAHN, 2006, 18 pages.
"User's Manual MioMap 2.0"; Aug. 2005; 60 pages.
"Windows Live Search for Mobile Goes Final, Still Great"; [online] [Retrieved on Mar. 11, 2007]; Retrieved from the Internet, URL: http://gizmodo.com/gadgets/software/windows-live-search-for-mobile-goes-final-still-great-236002.php; 3 pages.
"Windows Mobile 6 Professional Video Tour"; [online] [Retrieved on Mar. 11, 2007]; Retrieved from the Internet, URL: http://gizmodo.com/gadgets.cellphones/windows-mobile-6-professional-video-tour-237039.php; 4 pages.
"Windows Mobile"; Microsoft; 2007, 2 pages.
Anand et al., "Quantitative Analysis of Power Consumption for Location-Aware Applications on Smart Phones", IEEE International Symposium on Industrial Electronics, 2007.
Balliet, "Transportation Information Distribution System", IBM Technical Disclosure Bulletin, [online] [Retrieved Nov. 7, 2008] Retrieved from the Internet, URL: https://www.delphion.com/tdbs/tdb?order=86A+61395; Jun. 1986; 2 pages.
Beard et al., "Estimating Positions and Paths of Moving Objects", IEEE 2000, pp. 1-8.
Bederson, B.B., Audio Augmented Reality: A Prototype Automated Tour Guide [online] [retrieved on Aug. 30, 2002] [retrieved from http://www.cs.umd.edu/~bederson/papers/chi-95-aar/] pp. 1-4.
Berman et al., "The Role of Dead Reckoning and Inertial Sensors in Future General Aviation Navigation", IEEE, 1998, pp. 510-517.
Bevly et al., "Cascaded Kalman Filters for Accurate Estimation of Multiple Biases, Dead-Reckoning Navigation, and Full State Feedback Control of Ground Vehicles", IEEE Transactions on Control Systems in Technology, vol. 15, No. 2, Mar. 2007, pp. 199-208.
Binzhuo et al., "Mobile Phone GIS Based on Mobile SVG", IEEE 2005.
Bokharouss et al., "A Location-Aware Mobile Call Handling Assistant", International Conference on Advanced Information Networking and Applications Workshops, 2007.
Boonsrimuang et al., "Mobile Internet Navigation System", IEEE, 2002. pp. 325-328.
Camp et al., "A computer-based method for predicting transit time systems", Decsision Sciences, vol. 5, pp. 339-346, 1974.
Carew; "Phones that tell you where to drive, meet, eat"; [online] [Retrieved May 26, 2007]; Retrieved from the Internet <URL httlp://news.yahoo.com/s/nm/20070525/wr_nm/column_pluggedin_dc_2&printer=1;_ylt=Ahqaftn7xmlS2r0FZFeu9G4ht.cA; 2 pages.
Charney, "AT&T puts 411 to the text"; [online] [Retrieved Mar. 4, 2009]; Retrieved from the Internet <URL http://news.cnet.com/ATT-puts-411-to-the-text/2100-1039_3-1000669.html; May 8, 2003; 2 pages.
Christie et al., "Development and Deployment of GPS wireless devices for E911 and Location based services", IEEE 2002.
Chua et al., "Intelligent Portal for Event-triggered SMS Alerts", 2nd International Conference on Mobile Technology, Applications and Systems, 2005.
Civilis et al., "Efficient Tracking of Moving Objects with Precision Guarantees", IEEE, Proceedings of the first Annual International Conference on Mobile and Ubiquitous Systems: Networking and Services, 2004, 10 pages.

(56) **References Cited**

OTHER PUBLICATIONS

Dunn et al., "Wireless Emergency Call System", IBM TDB, Sep. 1994.
Ebine, "Dual Frequency resonant base station antennas for PDC systems in Japan", IEEE, pp. 564-567, 1999.
Evans, "In-Vehicle Man-Machine Interaction the Socrates Approach", Vehicle Navigation & Information System Conference Proceedings, 1994, Aug. 31-Sep. 2, 1994, pp. 473-477.
FM 3-25.26 Map Reading and Land Navigation Field Manual No. 3-25.26, Headquarters Department of the Army, Washington, DC [online] [retrieved on Apr. 9, 2004] [retrieved from http://155.217.58.58/cgi-bin/atdl.dll/fm/3-25.26/toc.htm] Jul. 20, 2001, pp. 1-7 and J-1 to J-3.
GPS 12 Personal Navigator Owner's Manual & Reference, Garmin Corporation, Jan. 1999, pp. 1-60.
Guo et al., "An Intelligent Query System based on Chinese Short Message Service for Restaurant Recommendation", IEEE 2007, 1 page.
Hameed et al., "An Intelligent Agent-Based Medication and Emergency System", IEEE 2006.
Helal et al., "Drishti: An Integrated Navigation System for Visually Impaired and Disabled", Fifth International Symposium on Wearable Computers (ISWC'01), IEEE, 2001, pp. 149-156.
Hohman et al., "GPS Roadside Integrated Precision Positioning System", Position Location and Navigation Symposium (IEEE 2000), pp. 221-230.
International Numbering and SMS—Type of Numbering, TON, Numbering Plan Indicator, NPI, [online] [Retrieved Jan. 5, 2007] Retrieved from the Internet <URL: http://www.activeexperts.com/support/activsms/tonnpi/.
Jain, R., Potential Networking Applications of Global Positioning Systems (GPS) [online] [retrieved on Nov. 18, 2008] [retrieved from http://arxiv.org/ftp/cs/papers/9809/9809079.pdf] OSU Technical Report TR-24, Apr. 1996, pp. 1-40.
Jirawimut et al., "A Method for Dead Reckoning Parameter Correction in Pedestrian Navigation System", IEEE Transactions on Instrumentation and Measurement, vol. 52, No. 1, Feb. 2003, pp. 209-215.
Ju et al., "RFID Data Collection and Integration based on Mobile Agent", IEEE, 2006.
Kbar et al., "Mobile Station Location based on Hybrid of Signal Strength and Time of Arrival", IEEE, 2005.
Koide et al., "3-D Human Navigation System with Consideration of Neighboring Space Information", IEEE International Conference on Systems, Man and Cybernetics, 2006 (SMC '06), vol. 2, (Oct. 8-11, 2006), pp. 1693-1698.
Lloyd et al., "Cellular phone base stations installation violate the Electromagnetic Compatibility regulations", IEEE, 2004.
Manabe et al., "On the M CubITS Pedestrian Navigation System", IEEE, 2006, pp. 793-798.
Meier et al., "Location-Aware Event-Base Middleware: A Paradigm for Collaborative Mobile Applications?", Sep. 2003.
Miller et al., "Synchronization of Mobile XML Databases by Utilizing Deferred Views", IEEE 2004.
Nardi et al., "Integrating Communication and Information through Contact Map", Communications of the ACM, vol. 45, No. 4, Apr. 2002.
Northard, "Docking Station Communication Link", IBM TDB, Feb. 1994.
Oh et al., "Spatial Applications Using 4S Technology for Mobile Environment", IEEE 2002.
Paksoy et al., "The Global Position System—Navigation Tool of the Future", Journal of Electrical & Electronics, 2002, No. 1, pp. 467-476.
Parikh, "Tele Locate", IBM Technical Disclosure Bulletin, [online] [Retrieved Nov. 7, 2008] Retrieved from the Internet, URL: https://www.delphion.com/tdbs/tdb?order=92A+62775; Sep. 1992; 1 page.
Partial International Search Report, dated Jul. 29, 2008, issued in corresponding PCT/US2008/050295.
International Search Report and Written Opinion, dated Jun. 9, 2008, issued in International Application No. PCT/US2007/088880, filed Dec. 27, 2007.
Pfoser et al., "Dynamic Travel Time Maps—Enabling Efficient Navigation", Proceedings of the 18th International Conference on Scientific and Statistical Database Management (SSDBM'06), IEEE, 10 pages.
Portfolio 2007; [online] [Retrieved on Jun. 14, 2007]; Retrieved from the Internet, URL: http://eric.wahlforss.com/folio; 3 pages.
Rekimoto, J. *Augment-able Reality: Situated Communication through Physical and Digital Spaces*, iswc, pp. 68, Second International Symposium on Wearable computers (ISWC'98), 1998, pp. 1-8.
Rogers et al., "Adaptive User Interfaces for Automotive Environments", IEEE Intelligent Vehicles Symposium 2000, Oct. 3-5, 2000, pp. 662-667.
Rozier, J., *Hear & There: An Augmented Reality System of Linked Audio*, Proceedings of the International Conference on Auditory Display, Atlanta, GA, Apr. 2000, pp. 1-6.
Samadani et al., "PathMaker: Systems for Capturing Trips", IEEE (2004) International Conference on Multimedia and Expo., Publication Date: Jun. 27-30, 2004, vol. 3, pp. 2123-2126, 2004.
Schreiner, "Where We At? Mobile Phones Bring GPS to the Masses", IEEE Computers Society, May/Jun. 2007, pp. 6-11.
Spohrer. "New Paradigms for Using Computers", 1997; retrieved from the Internet, URL: <http://almaden.ibm.com/npuc97/1997/spohrer.htm>.
Sung et al., "Towards Reliable Peer-to-Peer Data Sharing over Mobile Ad hoc Networks", IEEE, 2005.
Weiss et al., "Zone services—An approach for location-based data collection", Proceedings of the 8th International Conference on E-commerce Technology and the 3rd IEEE International Conference on Enterprise Computing, E-Commerce and E-Services (8 pages), 2006.
Yang et al., "A Mutlimedia System for Route Sharing and Video-based Navigation", IEEE, 2006, pp. 73-76.
Yang et al. "Global Snapshots for Distributed Debugging", IEEE, pp. 436-440, 1992.
Yanyan et al., "The model of optimum route selection in vehicle automatic navigation system based on unblocked reliability analyses", IEEE 2003.
"Cyberguide: a mobile context-aware tour guide", Wireless Networks Archive (Special Issue: Mobile computing and networking; selecting papers from MobiCom '96), 3(5):421-433, 1997.
"Frontiers in electronic media", Archive 4(4):32-64, 1997.
"Location-aware mobile applications based on directory services", International Conference on Mobile Computing and Networking Archive, Proceedings on the 3rd Annual ACM/IEEE International Conference on Mobile Computing and Networking, Budapest, Hungary, pp. 23-33, 1997.
Sharpe et al., U.S. Appl. No. 12/434,586, filed May 1, 2009.
Sharpe et al., U.S. Appl. No. 12/434,582, filed May 1, 2009.
Van Os et al., U.S. Appl. No. 12/165,413, filed Jun. 30, 2008.
Blumenberg et al., U.S. Appl. No. 12/119,316, filed May 12, 2008.
Low et al., U.S. Appl. No. 12/233,358, filed Sep. 18, 2008.
Sazegari et al., U.S. Appl. No. 12/122,339, filed May 16, 2008.
Johnson, U.S. Appl. No. 12/044,363, filed Mar. 7, 2008.
Johnson, U.S. Appl. No. 11/827,065, filed Jul. 10, 2007.
Herz, U.S. Appl. No. 12/270,814, filed Nov. 13, 2008.
US 6,731,928, 05/2004, Tanaka (withdrawn)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144
Notes
Clock
Address Book
Settings
146
148
150
152
110
112
114
116
104
N
W
E
S
Phone
Mail
Web
Media
118
120
170
162
190
164

FIG. 1

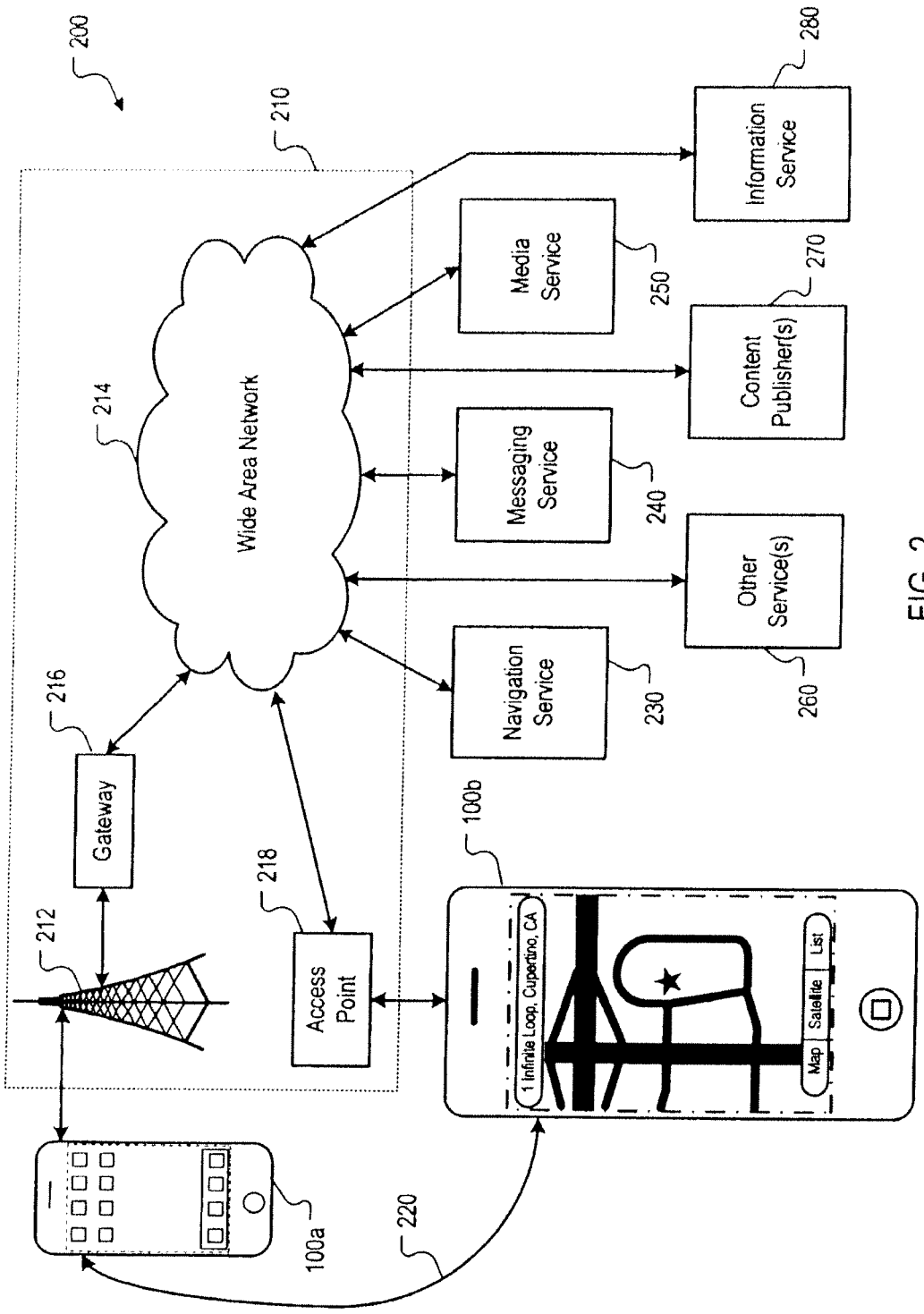

200
210
Wide Area Network
214
Gateway
216
212
Access Point
218
100a
100b
220
Information Service
280
Media Service
250
Content Publisher(s)
270
Messaging Service
240
Other Service(s)
260
Navigation Service
230
1 Infinite Loop, Cupertino, CA
Map
Satellite
List

FIG. 2

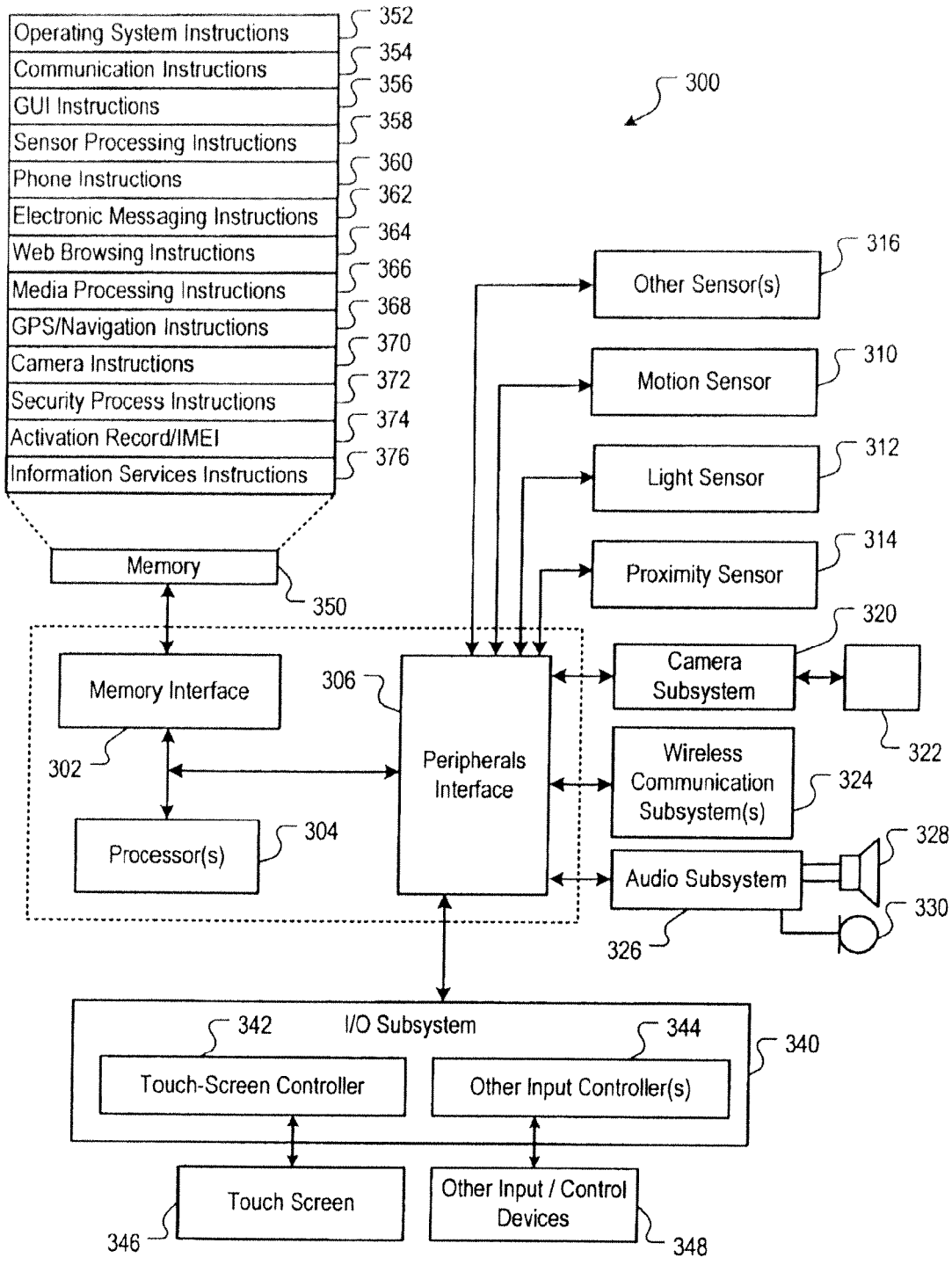
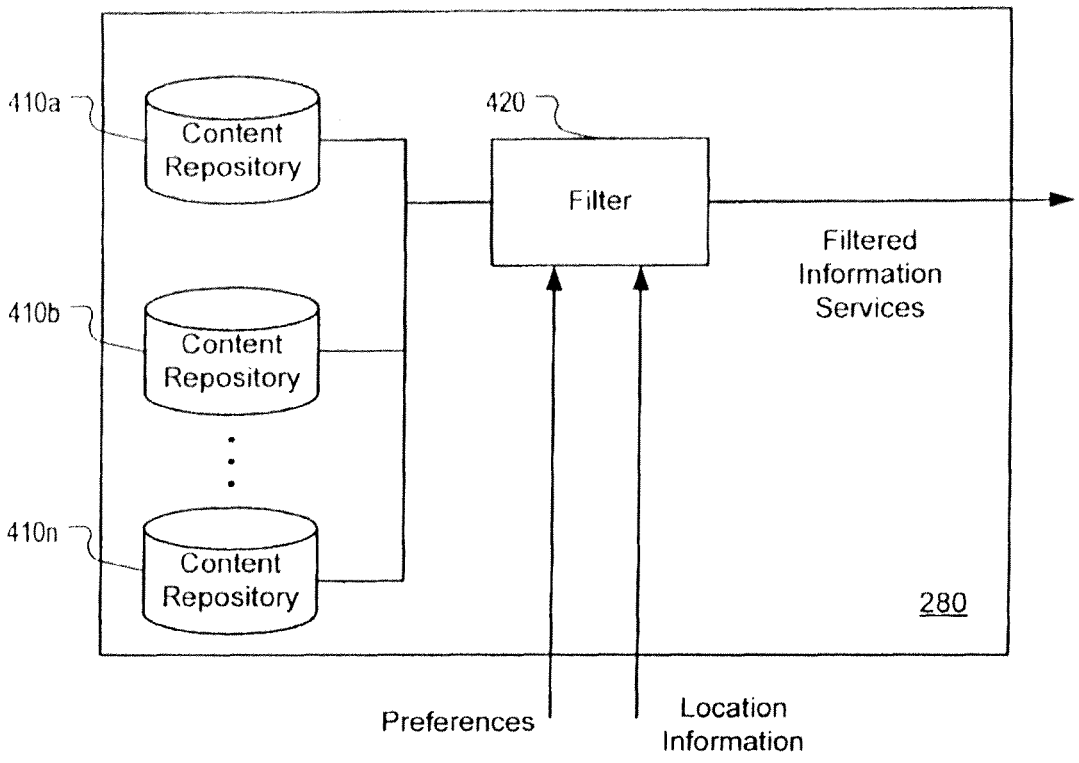

Operating System Instructions
Communication Instructions
GUI Instructions
Sensor Processing Instructions
Phone Instructions
Electronic Messaging Instructions
Web Browsing Instructions
Media Processing Instructions
GPS/Navigation Instructions
Camera Instructions
Security Process Instructions
Activation Record/IMEI
Information Services Instructions
352
354
356
358
360
362
364
366
368
370
372
374
376
300
Memory
350
Other Sensor(s)
316
Motion Sensor
310
Light Sensor
312
Proximity Sensor
314
320
Camera Subsystem
322
Memory Interface
302
306
Peripherals Interface
Wireless Communication Subsystem(s)
324
Processor(s)
304
328
Audio Subsystem
330
326
342
I/O Subsystem
344
340
Touch-Screen Controller
Other Input Controller(s)
Touch Screen
346
Other Input / Control Devices
348

FIG. 3

FIG. 4


410a
Content Repository
420
Filter
Filtered Information Services
410b
Content Repository
410n
Content Repository
280
Preferences
Location Information

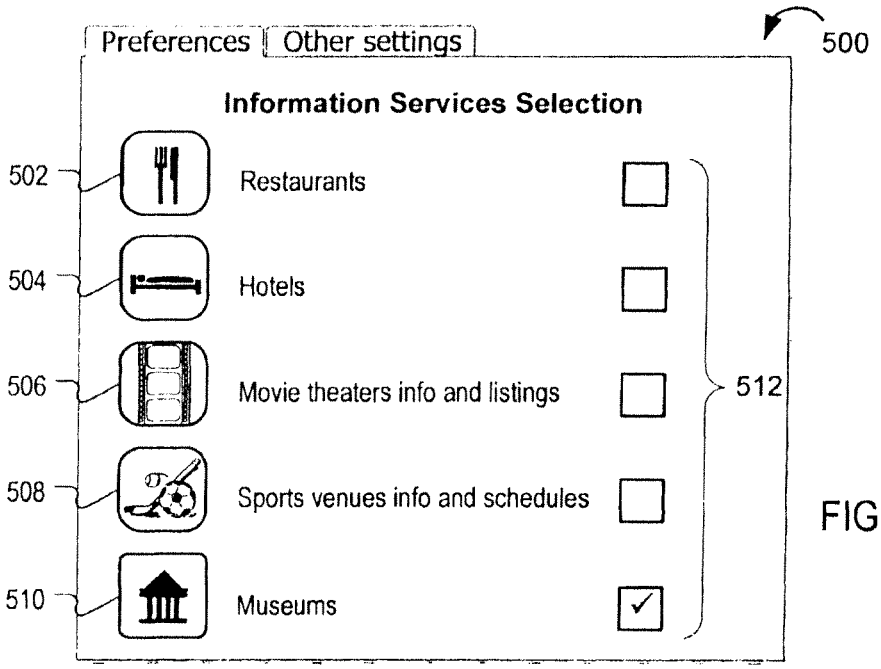

Preferences
Other settings
500
Information Services Selection
502
Restaurants
504
Hotels
506
Movie theaters info and listings
508
Sports venues info and schedules
510
Museums
512

FIG. 5A

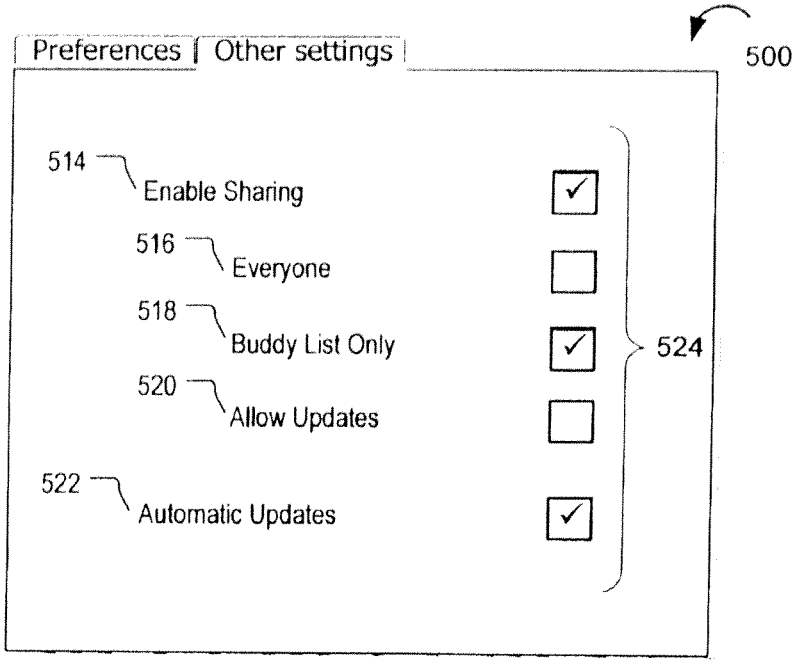

Preferences
Other settings
500
514
Enable Sharing
516
Everyone
518
Buddy List Only
520
Allow Updates
522
Automatic Updates
524

FIG. 5B

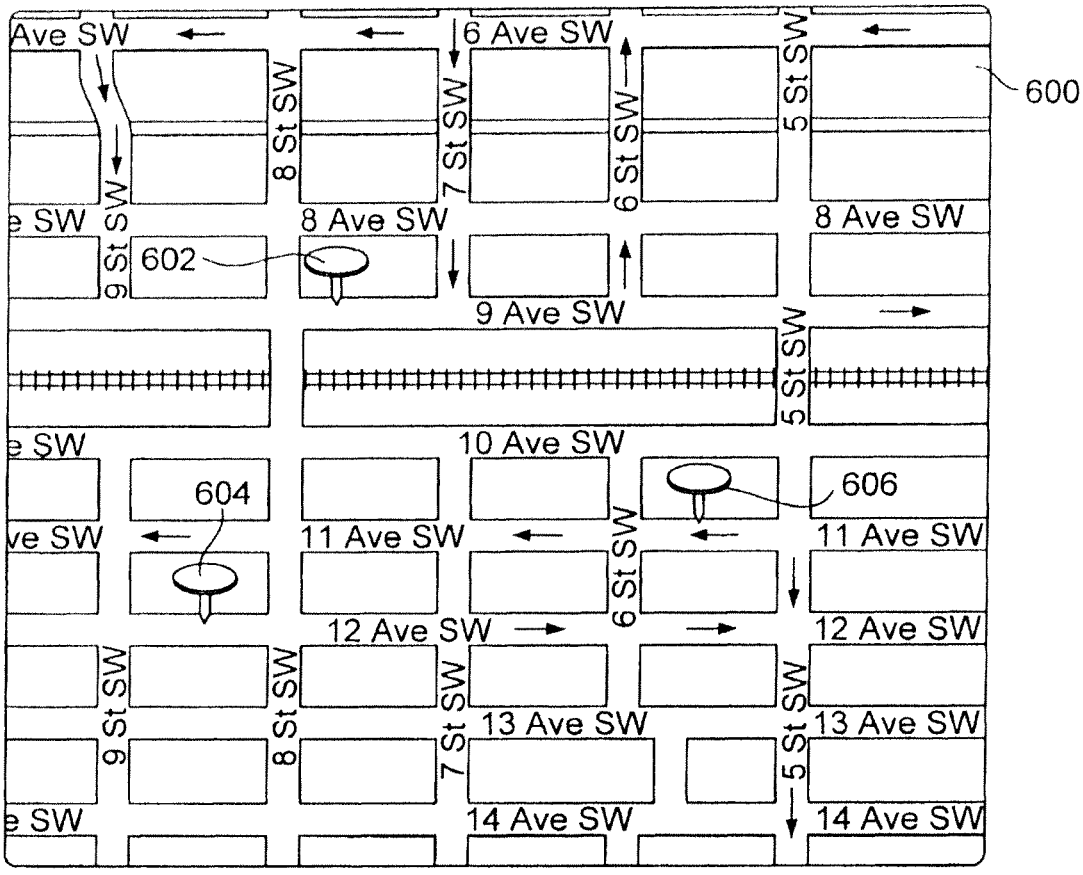

Ave SW
6 Ave SW
600
8 St SW
7 St SW
6 St SW
5 St SW
e SW
9 St SW
8 Ave SW
602
8 Ave SW
9 Ave SW
5 St SW
e SW
10 Ave SW
604
606
ve SW
11 Ave SW
11 Ave SW
6 St SW
12 Ave SW
12 Ave SW
9 St SW
8 St SW
7 St SW
5 St SW
13 Ave SW
13 Ave SW
e SW
14 Ave SW
14 Ave SW

FIG. 6A

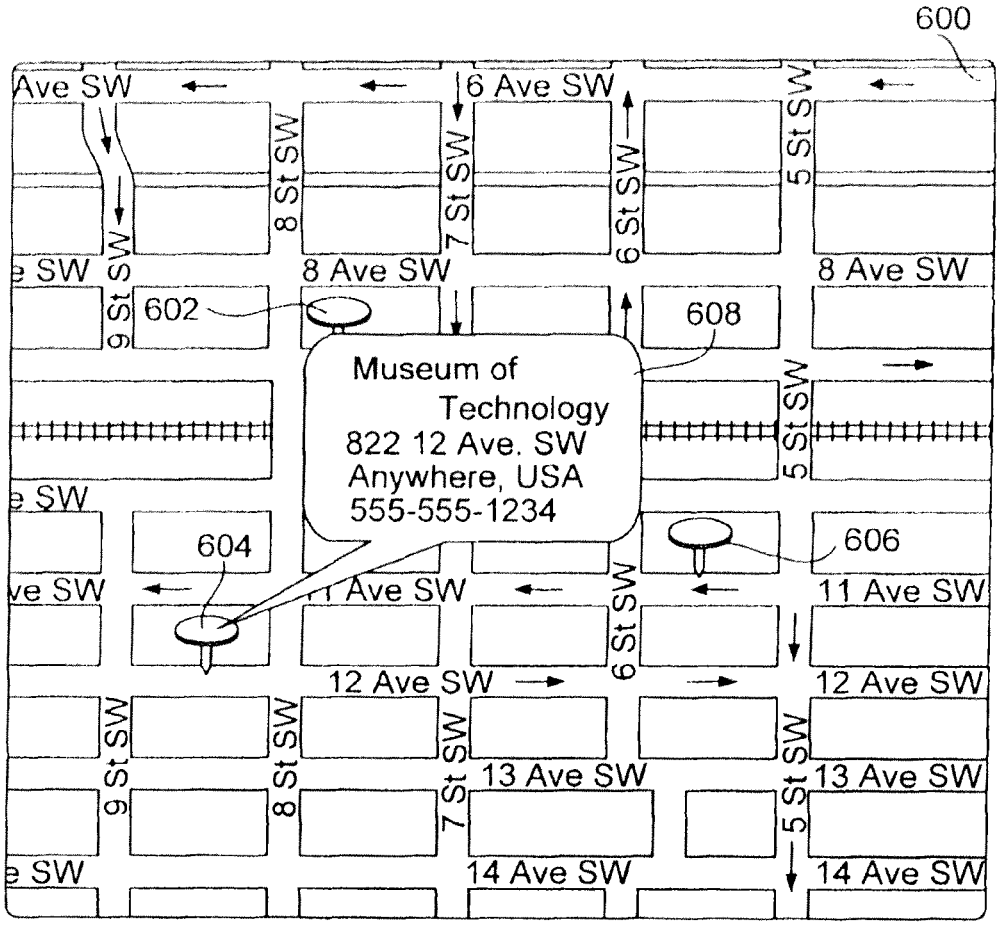

600
Ave SW
6 Ave SW
8 St SW
7 St SW
6 St SW
5 St SW
8 Ave SW
602
608
Museum of
Technology
822 12 Ave. SW
Anywhere, USA
555-555-1234
604
606
11 Ave SW
12 Ave SW
13 Ave SW
14 Ave SW
9 St SW

FIG. 6B

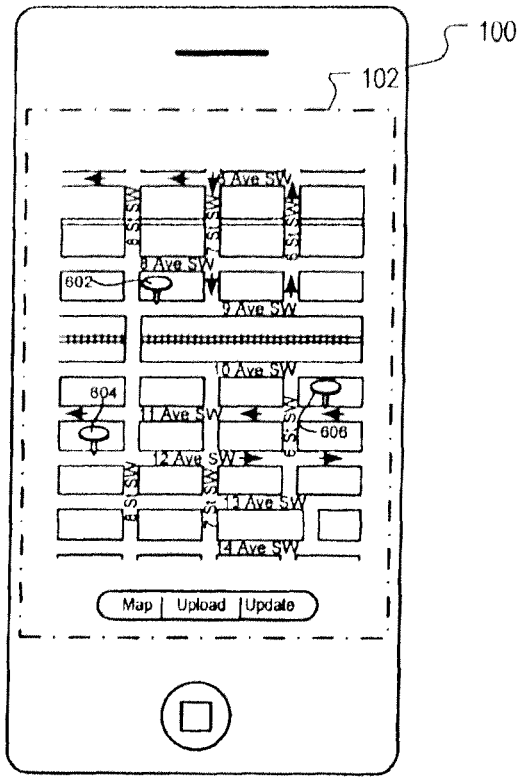

100
102
8 Ave SW
9 Ave SW
10 Ave SW
11 Ave SW
12 Ave SW
13 Ave SW
14 Ave SW
602
604
606
Map
Upload
Update

FIG. 6C

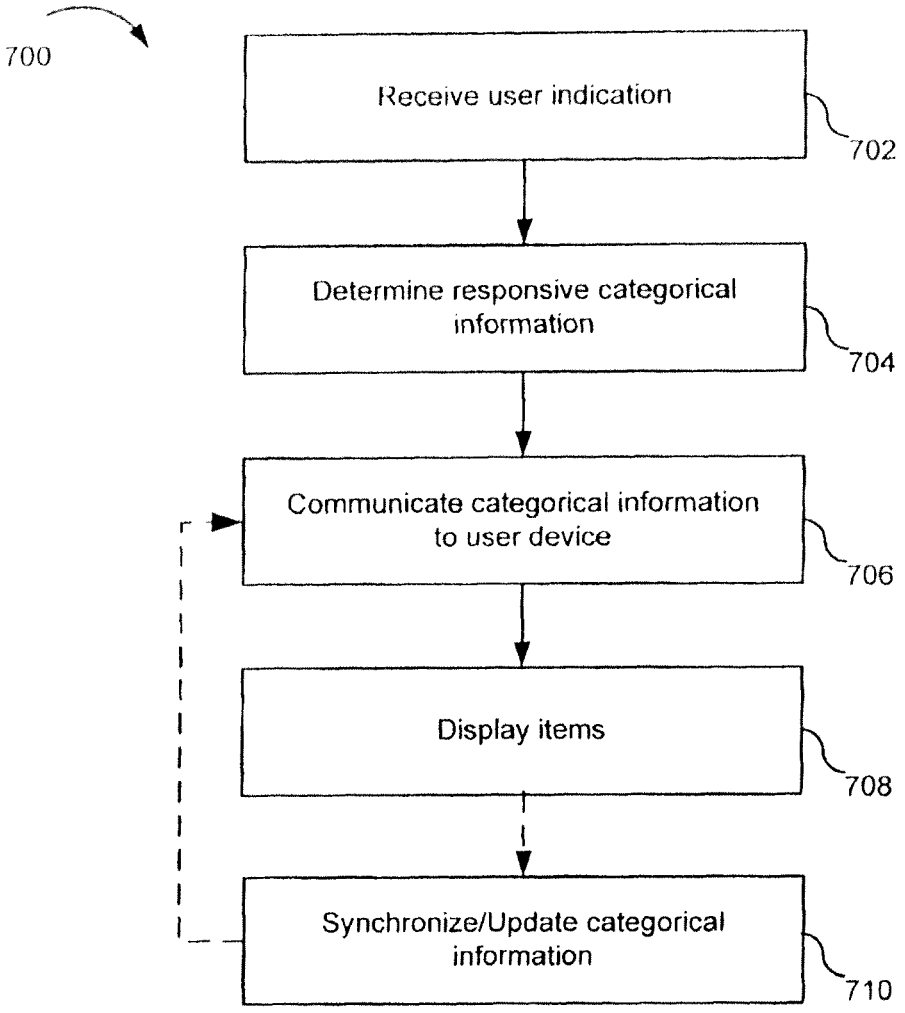

700
Receive user indication
702
Determine responsive categorical information
704
Communicate categorical information to user device
706
Display items
708
Synchronize/Update categorical information
710

FIG. 7

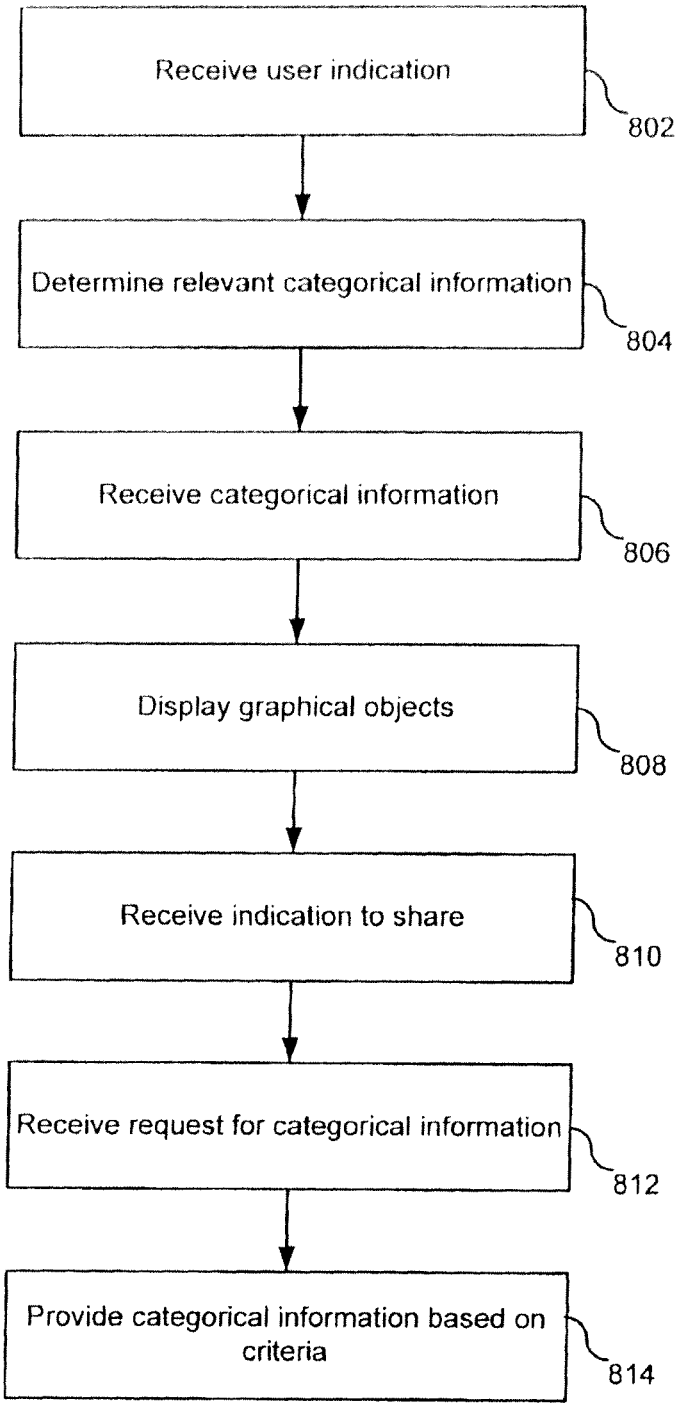

Receive user indication
802
Determine relevant categorical information
804
Receive categorical information
806
Display graphical objects
808
Receive indication to share
810
Receive request for categorical information
812
Provide categorical information based on criteria
814

FIG. 8

LOCATION-BASED CATEGORICAL INFORMATION SERVICES

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of co-pending U.S. application Ser. No. 13/673,915, filed on Nov. 9, 2012, which is a continuation of U.S. application Ser. No. 12/127,505 filed on May 27, 2008, now issued as U.S. Pat. No. 8,311,526, which claims priority to U.S. Provisional Patent Application Ser. No. 60/946,825 filed on Jun. 28, 2007, and entitled "LOCATION-BASED CATEGORICAL INFORMATION SERVICES," the contents of which are incorporated herein by reference.

TECHNICAL FIELD

The subject matter of this patent application is generally related to mobile devices.

BACKGROUND

Mobile devices have grown more powerful and feature-rich and now include such features as personal digital assistant (PDA) capabilities, cameras to capture video and still images, Internet access, etc. Location-based services have been developed for determining and tracking the locations of the users of mobile devices. Location-based services provide location-specific information to mobile devices, including for example, global positioning system (GPS) data to locate the mobile device on a map of a geographic region.

Some examples of location-based information include listings of events and sites of interest. A user wishing to gain this information can search the Internet, visit the local tourism office, or consult a travel guide or a local newspaper. However, these approaches require the user to actively search a resource, can be time-consuming, can provide outdated information, and can produce a large amount of information that may be of little interest to the user.

SUMMARY

Location-based information services can be provided to a user through a mobile device by providing categorical information from a network resource. The categorical information can be provided based on user preferences and/or a geographic location of the mobile device. Additionally, the user can provide location-based information to a network-based repository and/or service, where the user-provided information can be used to enrich information provided to other users.

In some implementations, a method includes: receiving first information associated with a category of interest from a mobile device; receiving second information identifying a geographic location of the mobile device; determining categorical information using the first information and the second information; and providing the categorical information to the mobile device as a data structure containing information used by the mobile device to represent the categorical information on a map by a graphical object.

In some implementations, a system includes a positioning system operable to obtain a current location of a mobile device, a data structure including a set of categorical information, and a map application operable to provide a display of a map. In some implementations, the map can include a graphical representation of an item in the set of categorical information, where the graphical representation can be displayed at a location corresponding to an address of the item.

In some implementations, a method includes: providing first information associated with a category of interest; providing second information associated with a location of a mobile device; receiving categorical information using the first information and the second information; receiving categorical information determined based on the first information and the second information; and displaying a map including graphical representations of one or more items in the categorical information, where the graphical representations are displayed at locations corresponding to addresses of the one or more items, and wherein the graphical representations are displayed based on a zoom level of the map.

Other implementations are disclosed, including implementations directed to systems, methods, apparatuses, computer-readable mediums and user interfaces.

DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram of an example mobile device.

FIG. **2** is a block diagram of an example network operating environment for the mobile device of FIG. **1**.

FIG. **3** is a block diagram of an example implementation of the mobile device of FIG. **1**.

FIG. **4** is a block diagram of an example implementation of the information service block of FIG. **2**.

FIG. **5**A illustrates an example of selecting categorical information for location-based information services.

FIG. **5**B illustrates an example of settings for categorical information provided to the mobile device.

FIGS. **6**A and **6**B illustrate an example of a user interface that displays locations of items that satisfy a request for categorical information.

FIG. **6**C illustrates an example mobile device presenting a user interface on the touch sensitive display.

FIG. **7** is a flow diagram of an example process for providing categorical information to the mobile device of FIG. **1**.

FIG. **8** is a flow diagram of an example process for selecting and sharing categorical information using the mobile device of FIG. **1**.

DETAILED DESCRIPTION

FIG. **1** is a block diagram of an example mobile device **100**. The mobile device **100** can be, for example, a handheld computer, a personal digital assistant, a cellular telephone, a network appliance, a camera, a smart phone, an enhanced general packet radio service (EGPRS) mobile phone, a network base station, a media player, a navigation device, an email device, a game console, or other electronic device, a combination of any two or more of these data processing devices or other data processing devices.

Mobile Device Overview

In some implementations, the mobile device **100** includes a touch-sensitive display **102**. The touch-sensitive display **102** can implement liquid crystal display (LCD) technology, light emitting polymer display (LPD) technology, or some other display technology. The touch-sensitive display **102** can be sensitive to haptic and/or tactile contact with a user.

In some implementations, the touch-sensitive display **102** can comprise a multi-touch-sensitive display **102**. A multi-touch-sensitive display **102** can, for example, process multiple simultaneous touch points, including processing data related to the pressure, degree and/or position of each touch

point. Such processing facilitates gestures and interactions with multiple fingers, chording, and other interactions. Other touch-sensitive display technologies can also be used, e.g., a display in which contact is made using a stylus or other pointing device. Some examples of multi-touch-sensitive display technology are described in U.S. Pat. Nos. 6,323,846, 6,570,557, 6,677,932, and U.S. Patent Publication 2002/0015024A1, each of which is incorporated by reference herein in its entirety.

In some implementations, the mobile device **100** can display one or more graphical user interfaces on the touch-sensitive display **102** for providing the user access to various system objects and for conveying information to the user. In some implementations, the graphical user interface can include one or more display objects **104**, **106**. In the example shown, the display objects **104**, **106**, are graphic representations of system objects. Some examples of system objects include device functions, applications, windows, files, alerts, events, or other identifiable system objects.

Exemplary Mobile Device Functionality

In some implementations, the mobile device **100** can implement multiple device functionalities, such as a telephony device, as indicated by a phone object **110**; an e-mail device, as indicated by the e-mail object **112**; a network data communication device, as indicated by the Web object **114**; a Wi-Fi base station device (not shown); and a media processing device, as indicated by the media player object **116**. In some implementations, particular display objects **104**, e.g., the phone object **110**, the e-mail object **112**, the Web object **114**, and the media player object **116**, can be displayed in a menu bar **118**. In some implementations, device functionalities can be accessed from a top-level graphical user interface, such as the graphical user interface illustrated in FIG. **1**. Touching one of the objects **110**, **112**, **114** or **116** can, for example, invoke corresponding functionality.

In some implementations, the mobile device **100** can implement network distribution functionality. For example, the functionality can enable the user to take the mobile device **100** and its associated network while traveling. In particular, the mobile device **100** can extend Internet access (e.g., Wi-Fi) to other wireless devices in the vicinity. For example, mobile device **100** can be configured as a base station for one or more devices. As such, mobile device **100** can grant or deny network access to other wireless devices.

In some implementations, upon invocation of device functionality, the graphical user interface of the mobile device **100** changes, or is augmented or replaced with another user interface or user interface elements, to facilitate user access to particular functions associated with the corresponding device functionality. For example, in response to a user touching the phone object **110**, the graphical user interface of the touch-sensitive display **102** may present display objects related to various phone functions; likewise, touching of the email object **112** may cause the graphical user interface to present display objects related to various e-mail functions; touching the Web object **114** may cause the graphical user interface to present display objects related to various Web-surfing functions; and touching the media player object **116** may cause the graphical user interface to present display objects related to various media processing functions.

In some implementations, the top-level graphical user interface environment or state of FIG. **1** can be restored by pressing a button **120** located near the bottom of the mobile device **100**. In some implementations, each corresponding device functionality may have corresponding "home" display objects displayed on the touch-sensitive display **102**, and the graphical user interface environment of FIG. **1** can be restored by pressing the "home" display object.

In some implementations, the top-level graphical user interface can include additional display objects **106**, such as a short messaging service (SMS) object **130**, a calendar object **132**, a photos object **134**, a camera object **136**, a calculator object **138**, a stocks object **140**, a weather object **142**, a maps object **144**, a notes object **146**, a clock object **148**, an address book object **150**, and a settings object **152**. Touching the SMS display object **130** can, for example, invoke an SMS messaging environment and supporting functionality; likewise, each selection of a display object **132**, **134**, **136**, **138**, **140**, **142**, **144**, **146**, **148**, **150** and **152** can invoke a corresponding object environment and functionality.

Additional and/or different display objects can also be displayed in the graphical user interface of FIG. **1**. For example, if the device **100** is functioning as a base station for other devices, one or more "connection" objects may appear in the graphical user interface to indicate the connection. In some implementations, the display objects **106** can be configured by a user, e.g., a user may specify which display objects **106** are displayed, and/or may download additional applications or other software that provides other functionalities and corresponding display objects.

In some implementations, the mobile device **100** can include one or more input/output (I/O) devices and/or sensor devices. For example, a speaker **160** and a microphone **162** can be included to facilitate voice-enabled functionalities, such as phone and voice mail functions. In some implementations, a loud speaker **164** can be included to facilitate hands-free voice functionalities, such as speaker phone functions. An audio jack **166** can also be included for use of headphones and/or a microphone.

In some implementations, a proximity sensor **168** can be included to facilitate the detection of the user positioning the mobile device **100** proximate to the user's ear and, in response, to disengage the touch-sensitive display **102** to prevent accidental function invocations. In some implementations, the touch-sensitive display **102** can be turned off to conserve additional power when the mobile device **100** is proximate to the user's ear.

Other sensors can also be used. For example, in some implementations, an ambient light sensor **170** can be utilized to facilitate adjusting the brightness of the touch-sensitive display **102**. In some implementations, an accelerometer **172** can be utilized to detect movement of the mobile device **100**, as indicated by the directional arrow **174**. Accordingly, display objects and/or media can be presented according to a detected orientation, e.g., portrait or landscape. In some implementations, the mobile device **100** may include circuitry and sensors for supporting a location determining capability, such as that provided by the global positioning system (GPS) or other positioning systems (e.g., systems using Wi-Fi access points, television signals, cellular grids, Uniform Resource Locators (URLs)). In some implementations, a positioning system (e.g., a GPS receiver) can be integrated into the mobile device **100** or provided as a separate device that can be coupled to the mobile device **100** through an interface (e.g., port device **190**) to provide access to location-based services.

The mobile device **100** can also include a camera lens and sensor **180**. In some implementations, the camera lens and sensor **180** can be located on the back surface of the mobile device **100**. The camera can capture still images and/or video.

The mobile device **100** can also include one or more wireless communication subsystems, such as an 802.11b/g com-

munication device **186**, and/or a Bluetooth™ communication device **188**. Other communication protocols can also be supported, including other 802.x communication protocols (e.g., WiMax, Wi-Fi, 3G), code division multiple access (CDMA), global system for mobile communications (GSM), Enhanced Data GSM Environment (EDGE), etc.

In some implementations, a port device **190**, e.g., a Universal Serial Bus (USB) port, or a docking port, or some other wired port connection, can be included. The port device **190** can, for example, be utilized to establish a wired connection to other computing devices, such as other communication devices **100**, network access devices, a personal computer, a printer, or other processing devices capable of receiving and/or transmitting data. In some implementations, the port device **190** allows the mobile device **100** to synchronize with a host device using one or more protocols, such as, for example, the TCP/IP, HTTP, UDP and any other known protocol. In some implementations, a TCP/IP over USB protocol can be used.

Network Operating Environment

FIG. **2** is a block diagram of an example network operating environment **200** for the mobile device **100** of FIG. **1**. The mobile device **100** of FIG. **1** can, for example, communicate over one or more wired and/or wireless networks **210** in data communication. For example, a wireless network **212**, e.g., a cellular network, can communicate with a wide area network (WAN) **214**, such as the Internet, by use of a gateway **216**. Likewise, an access point **218**, such as an 802.11g wireless access point, can provide communication access to the wide area network **214**. In some implementations, both voice and data communications can be established over the wireless network **212** and the access point **218**. For example, the mobile device **100***a* can place and receive phone calls (e.g., using VoIP protocols), send and receive e-mail messages (e.g., using POP3 protocol), and retrieve electronic documents and/or streams, such as web pages, photographs, and videos, over the wireless network **212**, gateway **216**, and wide area network **214** (e.g., using TCP/IP or UDP protocols). Likewise, the mobile device **100***b* can place and receive phone calls, send and receive e-mail messages, and retrieve electronic documents over the access point **218** and the wide area network **214**. In some implementations, the mobile device **100** can be physically connected to the access point **218** using one or more cables and the access point **218** can be a personal computer. In this configuration, the mobile device **100** can be referred to as a "tethered" device.

The mobile devices **100***a* and **100***b* can also establish communications by other means. For example, the wireless device **100***a* can communicate with other wireless devices, e.g., other wireless devices **100**, cell phones, etc., over the wireless network **212**. Likewise, the mobile devices **100***a* and **100***b* can establish peer-to-peer communications **220**, e.g., a personal area network, by use of one or more communication subsystems, such as the Bluetooth™ communication device **188** shown in FIG. **1**. Other communication protocols and topologies can also be implemented.

The mobile device **100** can, for example, communicate with one or more services **230**, **240**, **250**, **260** and **280** and/or one or more content publishers **270** over the one or more wired and/or wireless networks **210**. For example, a navigation service **230** can provide navigation information, e.g., map information, location information, route information, and other information, to the mobile device **100**. In the example shown, a user of the mobile device **100***b* has invoked a map functionality, e.g., by pressing the maps object **144** on the top-level graphical user interface shown in FIG. **1**, and has requested and received a map for the location "1 Infinite Loop, Cupertino, Calif."

A messaging service **240** can, for example, provide e-mail and/or other messaging services. A media service **250** can, for example, provide access to media files, such as song files, movie files, video clips, and other media data. One or more other services **260** can also be utilized by the mobile device **100**.

The mobile device **100** can also access other data and content over the one or more wired and/or wireless networks **210**. For example, content publishers, e.g., content publisher(s) **270**, such as news sites, RSS feeds, web sites, blogs, social networking sites, developer networks, etc., can be accessed by the mobile device **100**. Such access can be provided by invocation of a web browsing function or application (e.g., a browser) in response to a user touching the Web object **114**.

An information service **280** can include multiple content repositories populated with data regarding items of interest that are categorized. The information service block **280** can receive preferences and location information to generate categorical information as output. In some implementations, the information service block **280** is a network resource which can be accessed through a network connection (e.g., the Internet, wireless network).

Exemplary Mobile Device Architecture

FIG. **3** is a block diagram **300** of an example implementation of the mobile device **100** of FIG. **1**. The mobile device **100** can include a memory interface **302**, one or more data processors, image processors and/or central processing units **304**, and a peripherals interface **306**. The memory interface **302**, the one or more processors **304** and/or the peripherals interface **306** can be separate components or can be integrated in one or more integrated circuits. The various components in the mobile device **100** can be coupled by one or more communication buses or signal lines.

Sensors, devices and subsystems can be coupled to the peripherals interface **306** to facilitate multiple functionalities. For example, a motion sensor **310**, a light sensor **312**, and a proximity sensor **314** can be coupled to the peripherals interface **306** to facilitate the orientation, lighting and proximity functions described with respect to FIG. **1**. Other sensors **316** can also be connected to the peripherals interface **306**, such as a positioning system (e.g., GPS receiver), a temperature sensor, a biometric sensor, or other sensing device, to facilitate related functionalities.

A camera subsystem **320** and an optical sensor **322**, e.g., a charged coupled device (CCD) or a complementary metal-oxide semiconductor (CMOS) optical sensor, can be utilized to facilitate camera functions, such as recording photographs and video clips.

Communication functions can be facilitated through one or more wireless communication subsystems **324**, which can include radio frequency receivers and transmitters and/or optical (e.g., infrared) receivers and transmitters. The specific design and implementation of the communication subsystem **324** can depend on the communication network(s) over which the mobile device **100** is intended to operate. For example, a mobile device **100** may include communication subsystems **324** designed to operate over a GSM network, a GPRS network, an EDGE network, a Wi-Fi or WiMax network, and a Bluetooth™ network. In particular, the wireless communication subsystems **324** may include hosting protocols such that the device **100** may be configured as a base station for other wireless devices.

An audio subsystem **326** can be coupled to a speaker **328** and a microphone **330** to facilitate voice-enabled functions, such as voice recognition, voice replication, digital recording, and telephony functions.

The I/O subsystem **340** can include a touch screen controller **342** and/or other input controller(s) **344**. The touch-screen controller **342** can be coupled to a touch screen **346**. The touch screen **346** and touch screen controller **342** can, for example, detect contact and movement or break thereof using any of a plurality of touch sensitivity technologies, including but not limited to capacitive, resistive, infrared, and surface acoustic wave technologies, as well as other proximity sensor arrays or other elements for determining one or more points of contact with the touch screen **346**.

The other input controller(s) **344** can be coupled to other input/control devices **348**, such as one or more buttons, rocker switches, thumb-wheel, infrared port, USB port, and/or a pointer device such as a stylus. The one or more buttons (not shown) can include an up/down button for volume control of the speaker **328** and/or the microphone **330**.

In one implementation, a pressing of the button for a first duration may disengage a lock of the touch screen **346**; and a pressing of the button for a second duration that is longer than the first duration may turn power to the mobile device **100** on or off. The user may be able to customize a functionality of one or more of the buttons. The touch screen **346** can, for example, also be used to implement virtual or soft buttons and/or a keyboard.

In some implementations, the mobile device **100** can present recorded audio and/or video files, such as MP3, AAC, and MPEG files. In some implementations, the mobile device **100** can include the functionality of an MP3 player, such as an iPod™. The mobile device **100** may, therefore, include a 36-pin connector that is compatible with the iPod. Other input/output and control devices can also be used.

The memory interface **302** can be coupled to memory **350**. The memory **350** can include high-speed random access memory and/or non-volatile memory, such as one or more magnetic disk storage devices, one or more optical storage devices, and/or flash memory (e.g., NAND, NOR). The memory **350** can store an operating system **352**, such as Darwin, RTXC, LINUX, UNIX, OS X, WINDOWS, or an embedded operating system such as VxWorks. The operating system **352** may include instructions for handling basic system services and for performing hardware dependent tasks. In some implementations, the operating system **352** can be a kernel (e.g., UNIX kernel).

The memory **350** may also store communication instructions **354** to facilitate communicating with one or more additional devices, one or more computers and/or one or more servers. The memory **350** may include graphical user interface instructions **356** to facilitate graphic user interface processing; sensor processing instructions **358** to facilitate sensor-related processing and functions; phone instructions **360** to facilitate phone-related processes and functions; electronic messaging instructions **362** to facilitate electronic-messaging related processes and functions; web browsing instructions **364** to facilitate web browsing-related processes and functions; media processing instructions **366** to facilitate media processing-related processes and functions; GPS/Navigation instructions **368** to facilitate GPS and navigation-related processes and instructions; camera instructions **370** to facilitate camera-related processes and functions; and/or other software instructions **372** to facilitate other processes and functions.

Each of the above identified instructions and applications can correspond to a set of instructions for performing one or more functions described above. These instructions need not be implemented as separate software programs, procedures or modules. The memory **350** can include additional instructions or fewer instructions. Furthermore, various functions of the mobile device **100** may be implemented in hardware and/or in software, including in one or more signal processing and/or application specific integrated circuits.

Exemplary Information Service Block Architecture

FIG. **4** is a block diagram of an example implementation of the information service block **280** of FIG. **2**. The information service block **280** includes multiple content repositories **410***a*, **410***b* . . . **410***n* and a filter **420**. The information service block **280** can receive preferences and location information as input, and generates filtered information services as output. In some implementations, the information service block **280** is a network resource which can be accessed through a network connection (e.g., the Internet, wireless network).

The content repositories **410** or content databases store location-based information. Some examples of location-based content items include information about points of interest (e.g., museums, zoos, historical sites, famous homes), shopping (e.g., specialty stores, jewelry, music stores, antiques), and information about local activities (e.g., hiking, skydiving, birdwatching). In some implementations, the location-based information can be indexed (e.g., an inverse index) in the content repositories **410** by geographic location or region, such as, for example, by metropolitan region, county, town, zip code, or telephone area code.

The information service block **280** can receive from the mobile device **100**, through the wired and/or wireless networks **210**, preferences and location information, e.g., user preferences and user geographic location information. The geographic location information can be provided by the mobile device **100** using GPS or other positioning systems (e.g., systems using Wi-Fi access points, television signals, cellular grids, or URLs). The geographic location information can be received, for example, as latitudinal and longitudinal coordinates, as a region associated with a Wi-Fi access point, or as a metropolitan region, a county, or a town. In some implementations, the mobile device **100** pushes geographic location information to the information service block **280** through the wired and/or wireless networks **210**.

In some implementations, user preferences can define the types of location-based information the user of the mobile device **100** wishes to receive. For example, the user can choose to receive certain categories of information. Setting preferences for information services is described in more detail with reference to FIGS. **5**A-**5**B. In some implementations, if the user preferences have not been set, the information service block **280** can use default settings for the mobile device **100**.

The filter **420** of the information service block **280** can receive as an input user preferences, location information, and/or location-based information from the content repositories **410**. In some implementations, the filter **420** also receives location-based information from content repositories or servers remote to the information service block **280**. The output of the filter **420** and the information service block **280** is categorical information that conforms to the input preferences and that can be location-specific, based on the input location information. In some implementations, the location-based information is stored on the mobile device **100**, and filtering of the location-based information is performed by the mobile device **100**.

Exemplary Preference Setting for Location-Based Information Services

FIG. **5**A illustrates an example **500** of selecting categorical information and setting preferences for location-based information services provided by the mobile device **100** of FIG. **1**. The example **500** uses a graphical user interface with a tabbed window which can be displayed in, for example, the touch-sensitive display **102** of the mobile device **100**, or in a display of an access device **218** (e.g., a personal computer) when the mobile device **100** is in communication with the access device **218**. For example, a mobile service application of the access device **218** can allow a user to set preferences for the location-based information services.

In this example, a user of the mobile device **100** can choose to receive categorical information corresponding to restaurants **502**, hotels **504**, movie theaters information and listings **506**, sports venues information and schedules **508**, and museums **508**. The user can select the types of categorical information to be retrieved by checking the corresponding checkbox **512** for the desired topic. In the example **500**, the user has set the preferences for the location-based information services by choosing to receive categorical information related only to museums **508**. In some implementations, more than one category can be selected or a new category can be input by the user using, e.g., the touch-sensitive display **102** of the mobile device **100**. In some implementations, one or more of the categories shown in FIG. **5**A can have subcategories that can be selected to further refine the information to be provided to the mobile device. The subcategories can be accessed through menus or other control structures.

In some implementations, the user sets the preferences at the time the mobile device **100** is configured or activated. The user can modify the preference settings at a later date. In some implementations, the first time a user requests location-based information services (e.g., by selecting the information services object **122** of FIG. **1**), the user is presented with the information services selection interface, such as the tabbed window in example **500**.

FIG. **5**B illustrates an example **530** of other settings for categorical information provided to the mobile device **100**. In an implementation, a user can share categorical information with others. In the example **500**, a user can enable sharing **514** and define how the categorical information is to be shared using checkboxes **524** (e.g., with everyone **516** or only with contacts on a "buddy list" **518**). In another implementation, a user can set a preference to enable others to update the categorical information. In the example **500**, a checkbox **524** is provided to allow updates **520** by others (i.e., everyone **516** or only buddy list contacts **518**, as specified by a user).

In an implementation, automatic updates **522** to the categorical information can be provided to the mobile device **100**. For example, if a user selects museums **508**, and a new museum opens or updates its content, the categorical information provided to the mobile device **100** can be updated automatically to reflect the updated information.

Referring now to FIGS. **6**A-B, an example of user interface **600** that displays graphical objects **602**, **604** and **606** representing the locations of items of interest that satisfy a request for categorical information (e.g. museums). In an implementation, the graphical objects **602**, **604** and **606** appear as push pins that are "pinned" to a map at their corresponding locations. In one implementation, the user can define a setting within the mobile device **100** to specify a proximity condition that must be satisfied by an item before a push pin is shown on the map representing an item that satisfies a condition. In an example, the proximity condition can specify that the item's location be within a certain radius of the current location of the mobile device **100** in order to be displayed on the map **600**. In some implementations, the categorical information can be manually updated in response to a user selection of an update option.

In yet another example, the proximity condition can specify that the item's location be within the geographic parameters of the map displayed to the user in order to be displayed on the map **600**. In such an example, if the user selects to "zoom out" the map to display a larger geographical area, then multiple other push pins may appear corresponding to locations within the larger geographical area. In another implementation, the proximity condition can specify that the graphical objects are displayed and/or removed from the map **600** as the displayed map **600** changes to indicate movement of the mobile device **100**.

As mentioned above, each pushpin **602**, **604** and **606** represents an item that satisfies a condition (e.g., a request for categorical information). If the user desires to retrieve information about a particular item represented by a push pin, the user can select the push pin and information included in the address book is retrieved and provided to the user. For example, in one implementation where the mobile device **100** includes a touch sensitive display (e.g., touch sensitive display **102** shown in FIG. **1**), the user can touch a push pin to select the push pin, and the contact information for the item of interest corresponding to the push pin is displayed or otherwise presented to the user (e.g., as an audio and/or video presentation).

In one implementation, a single touch of the push pin, e.g., a tap on the touch sensitive display can yield a first result and a sustained touch of the push pin can yield a second result (examples of first and second results are described below). In another implementation, where a user can interact with the map **600** using a pointing device (e.g., a joystick), hovering a cursor over the push pin can yield the first result and clicking the push pin can yield the second result.

Referring now to FIG. **6**B, an example of information that can be provided to the user upon selecting a push pin is shown. In this example, the user selected the push pin **604** and a first result is displayed. The first result is displayed in an information balloon **608** superimposed on the map **600**. The information balloon **608** includes contact information (e.g., the name, address and telephone number) of the item represented by the push pin **604**. In this example, the user tapped on the touch sensitive display **102** in the vicinity of the push pin **604** to yield this first result, being the contact information for this particular item.

The configuration of the graphical user interface presenting the information balloon **608** can be configured differently and can include different, or more or less information about the item in other implementations.

Another example of selecting a graphical object, such as, a sustained touch of the push pin, can result in an initiation of a telephone call to the contact telephone number presented as the first result. For example, a sustained touch of the push pin **604** can result in a telephone call being initiated to item of interest represented by the push pin **604**. In another implementation, driving directions can be provided from the current location of the mobile device **100** to the item of interest. In yet another implementation, an e-mail can be sent to contacts on a buddy list inviting others to meet the user of the mobile device at the item of interest.

FIG. **6**C is an example mobile device **100** presenting a user interface on the touch sensitive display **102**. The user interface includes the map **600** displaying the graphical objects **602**, **604** and **606**. An input user interface **610** is provided to

present options to a user. In an implementation, a user can choose to share the categorical information (e.g., a data structure represented by the graphical objects **602**, **604** and **606**) through an interface provided by an information service **280**. For example, the data representative of the graphical objects **602**, **604** and **606** can be stored in the memory **350** of the mobile device **100** and communicated by the wireless communication subsystem **324** to the information service **280** by selecting an upload option. In another implementation, the information service **280** can maintain a version of the data structure that was communicated to the mobile device **100** for access by others. In another implementation, a second mobile device can establish a peer-to-peer connection with the mobile device **100** to receive the data representative of the graphical objects **602**, **604** and **606**.

In an implementation, the data at the information service **280** can be shared with others in accordance with access rights as described above regard to FIG. **5**B. Other users can retrieve the data from the information service **280** and display the categorical information as graphical objects using another mobile device, personal computer, set-top box, gaming device, portable video player or portable image viewer.

In an implementation, according to, e.g., a user selection or system setting, data that satisfies the request for categorical information can be manually updated in response to an input. Manual updates can be retrieved from the information service **280** and provided to the mobile device **100** as new or updated information that satisfies the request for categorical information becomes available at the information service **280**.

Exemplary Location-Based Information Services Process

FIG. **7** is a flow diagram of an example process **700** for providing categorical information to the mobile device **100** of FIG. **1**. In an implementation, the example process **700** can be implemented as instructions stored in memory **350** and executed on the processor **304** and/or instructions executed by the information service **280**. At stage **702**, a user indication is received. For example, a user may input a request for categorical information by using the user interface **500** shown in FIG. **5**A that is received by the information service **280**.

At stage **704**, a responsive collection of categorical information is determined. For example, in response to the request made by a user, the information service **280** can assemble categorical data responsive to the categorical topic selected by the user in the interface **500** shown in FIG. **5**A using a system such as shown in FIG. **4**.

At stage **706**, categorical information is received. For example, the mobile device **100** can receive categorical information in a data structure from the information service **280** using the wireless communication subsystem **324**.

At stage **708**, the categorical data is displayed. For example, the categorical data is displayed in the touch sensitive display **102**, as graphical objects representing items of interest, such as shown in FIGS. **6**A and **6**B.

Optionally, at stage **710**, the categorical data is updated. For example, in response to a user input or a system setting, updates to the categorical information can be communicated to, or synchronized with, the mobile device **100** to update the display shown in the touch sensitive display **102** or the data stored at the information service **280**. The updating/synchronization can be automatic or manually initiated by user input.

FIG. **8** is a flow diagram of an example process **800** for selected and sharing categorical information. In an implementation, the example process **800** can be implemented as instructions stored in memory **350** and executed on the processor **304** and/or instructions executed by the information service **280**. At stage **802**, a user indication is received. For example, a user may input a request for categorical information by using the user interface **500** shown in FIG. **5**A that is received by the information service **280**.

At stage **804**, a responsive collection of categorical information is determined. For example, in response to the request made by a user, the information service **280** can assemble categorical data responsive to the categorical topic selected by the user in the interface **500** shown in FIG. **5**A using a system such as shown in FIG. **4**.

At stage **806**, categorical information is received. For example, the mobile device **100** can receive categorical information in a data structure from the information service **280** using the wireless communication subsystem **324**.

At stage **808**, the categorical data is displayed. For example, the categorical data is displayed in the touch sensitive display **102**, as graphical objects representing items of interest, such as shown in FIGS. **6**A and **6**B.

At stage **810**, an indication to share the categorical data is received. For example, using an interface such as FIGS. **5**A and **6**C, a user of the mobile device **100** can indicate using the touch sensitive display **102** that the collection of categorical data is to be shared with others. The categorical information can be uploaded from the mobile device **100** to an information service **280**, or the information service **280** can retain a version of the categorical data that is made accessible to others.

At stage **812**, a request is received. For example, the information service **280** can receive a request from a second user for the collection of categorical information specified by the user of the mobile device **100**. The second user can be authenticated against the access rights set by the user of the mobile device **100**.

At stage **814**, the collection of categorical information is provided. For example, the requester of the categorical information can receive the collection created by the user of the mobile device **100** at another mobile device, personal computer, set-top, video player, or image viewer. The collection of categorical data is provided in accordance with the criteria indicated in, for example, FIG. **5**B.

The disclosed embodiments can be implemented in a computing system that includes a back end component, e.g., as a data server, or that includes a middleware component, e.g., an application server, or that includes a front end component, e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation of what is disclosed here, or any combination of one or more such back end, middleware, or front end components. The components of the system can be interconnected by any form or medium of digital data communication, e.g., a communication network. Examples of communication networks include a local area network ("LAN") and a wide area network ("WAN"), e.g., the Internet.

The computing system can include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

While this specification contains many specifics, these should not be construed as limitations on the scope of what being claims or of what may be claimed, but rather as descriptions of features specific to particular embodiments. Certain features that are described in this specification in the context of separate embodiments can also be implemented in combination in a single embodiment. Conversely, various features that are described in the context of a single embodiment can

also be implemented in multiple embodiments separately or in any suitable sub-combination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a sub-combination or variation of a sub-combination.

Similarly, while operations are depicted in the drawings in a particular order, this should not be understand as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the embodiments described above should not be understood as requiring such separation in all embodiments, and it should be understood that the described program components and systems can generally be integrated together in a single software product or packaged into multiple software products.

Various modifications may be made to the disclosed implementations and still be within the scope of the following claims.

What is claimed is:

1. A method comprising:

receiving, from a first device, a request for categorical information, the request specifying a category;

storing a collection of shared categorical information;

determining relevant categorical information from the collection, the relevant categorical information comprising categorical data representative of a content item, wherein the categorical data is responsive to the category, and wherein the categorical data includes location information for the content item, wherein the location information satisfies a location-based conditional setting of the first device; and

providing, to the first device, the relevant categorical information for representation as a graphical object at a location in a map on a display, wherein the location corresponds to the location information.

2. The method of claim **1**, wherein the graphical object comprises a virtual push pin.

3. The method of claim **1**, wherein the location-based conditional setting specifies a proximity condition that the content item be located within a threshold distance from a current position of the first device.

4. The method of claim **1**, wherein the location-based conditional setting specifies a condition that the content item be located within a geographical parameter of the map on the display.

5. The method of claim **1**, wherein the providing is automatic in response to the content item satisfying the location-based conditional setting.

6. The method of claim **1**, wherein the request comprises a selection of a manual update option on the first device.

7. The method of claim **1**, wherein a second device sets access rights for the collection of shared categorical information, the access rights enabling sharing of the collection, and further comprising:

authenticating the first device against the access rights to allow the first device to share the collection.

8. A non-transitory computer-readable medium having instructions that when executed cause an information service to perform operations comprising:

receiving, from a first device, a request for categorical information, the request specifying a category;

storing a collection of shared categorical information;

determining relevant categorical information from the collection, the relevant categorical information comprising categorical data representative of a content item, wherein the categorical data is responsive to the category, and wherein the categorical data includes location information for the content item, wherein the location information satisfies a location-based conditional setting of the first device; and

providing, to the first device, the relevant categorical information for representation as a graphical object at a location in a map on a display, wherein the location corresponds to the location information.

9. The non-transitory computer-readable medium of claim **8**, wherein the graphical object comprises a virtual push pin.

10. The non-transitory computer-readable medium of claim **8**, wherein the location-based conditional setting specifies a proximity condition that the content item be located within a threshold distance from a current position of the first device.

11. The non-transitory computer-readable medium of claim **8**, wherein the location-based conditional setting specifies a condition that the content item be located within a geographical parameter of the map on the display.

12. The non-transitory computer-readable medium of claim **8**, wherein the providing is automatic in response to the content item satisfying the location-based conditional setting.

13. The non-transitory computer-readable medium of claim **8**, wherein the request comprises a selection of a manual update option on the first device.

14. The non-transitory computer-readable medium of claim **8**, wherein a second device sets access rights for the collection of shared categorical information, the access rights enabling sharing of the collection, and further comprising:

authenticating the first device against the access rights to allow the first device to share the collection.

15. A system comprising an information service having one or more data processors configured to perform operations comprising:

receiving, from a first device, a request for categorical information, the request specifying a category of the first device;

storing a collection of shared categorical information;

determining relevant categorical information from the collection, the relevant categorical information comprising categorical data representative of a content item, wherein the categorical data is responsive to the category, and wherein the categorical data includes location information for the content item, wherein the location information satisfies a location-based conditional setting of the first device; and

providing, to the first device, the relevant categorical information for representation as a graphical object at a location in a map on a display, wherein the location corresponds to the location information.

16. The system of claim **15**, wherein the graphical object comprises a virtual push pin.

17. The system of claim **15**, wherein the location-based conditional setting specifies a proximity condition that the content item be located within a threshold distance from a position of the first device.

18. The system of claim **15**, wherein the location-based conditional setting specifies a condition that the content item be located within a geographical parameter of the map on the display.

19. The system of claim **15**, wherein the providing is automatic in response to the content item satisfying the location-based conditional setting.

20. The system of claim **15**, wherein the request comprises a selection of a manual update option on the first device.

21. The system of claim **15**, wherein a second device sets access rights for the collection of shared categorical information, the access rights enabling sharing of the collection, and the operations further comprising:

authenticating the first device against the access rights to allow the first device to share the collection.

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